

# ATA

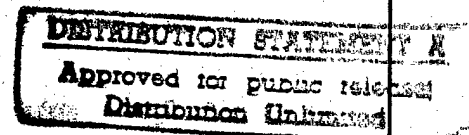
Applied  
Technology  
Associates, Inc.

## RED TIGRESS MISSION REPORT

Prepared by:  
Michael Dillow

Submitted by:  
APPLIED TECHNOLOGY ASSOCIATES, INC.  
P.O. Box 9154  
Albuquerque, New Mexico 87119

Submitted to:  
Capt. Joe Bergin  
PL/LITT  
Kirtland Air Force Base  
Albuquerque, NM 87117



6 December 1991

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**Abstract:** Red Tigress was a pair of SDIO sponsored launches which carried a variety of deployables to be observed by the Malabar ground site. The launch vehicle was a solid fuel Aries Rocket integrated by Orbital Sciences Corporation. Red Tigress I was launched on August 22, 1991. The vehicle suffered a severe guidance error and was destroyed approximately 20 seconds after liftoff. Red Tigress II was subsequently delayed to prevent this error from reoccurring. A further delay arose due to payload problems. On October 14, 1991, Red Tigress II successfully launched and completed its mission. The remainder of this report discusses the results of the Tracking Field Experiments participation in Red Tigress.  
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## 1.0 INTRODUCTION

Red Tigress was a pair of SDIO sponsored launches which carried a variety of deployables to be observed by the Malabar ground site. The launch vehicle was a solid fuel Aries rocket integrated by the Orbital Sciences Corporation. Red Tigress I was launched on August 22, 1991. The vehicle suffered a severe guidance error and was destroyed approximately 20 seconds after liftoff. Red Tigress II was subsequently delayed to prevent this error from reoccurring. A further delay arose due to payload problems. On October 14, 1991, Red Tigress II successfully launched and completed its mission. The remainder of this report discusses the results of the Tracking Field Experiments participation in Red Tigress.

## 2.0 THE TFE ROLE IN RED TIGRESS

TFE was given permission to track and illuminate both Red Tigress launches during the boost phase of the mission. Early attempts were made to affix reflexite to the rocket as an active tracking aid. The exterior coating of the rocket prevented the adhesive on the reflexite from attaching. TFE never acquired Red Tigress I because of its early destruction

The primary goals of TFE during the Red Tigress II mission were to establish a stabilized passive track of the booster plume, illuminate the plume, and transition to an active track of the laser return from the plume. A secondary goal was to collect calibrated video plume data.

The following sections of this report detail the goals and results of the TFE segment of Red Tigress II.

- 3.0 TFE System Configuration
- 4.0 Camera Calibration
- 5.0 Timeline of Mission Events and Data
- 6.0 Discussion of Mission Events and Data

Appendix A contains copies of the mission log and various plots of data acquired during the mission. Appendix B contains camera calibration logs. Appendix C contains copies of the frame-by-frame VODR timestamp logs. Appendix D contains a list of data sources and acquired signals. Appendix E gives a brief discussion of the pre mission satellite track and contains a copy of the satellite track log.

### **3.0 TFE SYSTEM CONFIGURATION**

#### **3.1 Optical Subsystems**

For this mission, the standard TFE laser bench and camera bench configurations were used. The FSM was installed and operational during the mission. The IR camera was not installed. All cameras were boresighted to a star and the resultant boresights were very good. System alignment between the laser and T1 was verified at T-60 min. Range gating of the Intensified Boresight (IB) camera was performed by the range-gate board installed in the Digital Tracker (DT). IB camera gain could also be controlled from the DT. All other cameras were left with fixed gains with the option of inserting ND filters in the image path of the WFOV and NFOV cameras.

#### **3.2 Tracker and Gimbal Drive**

The DT was configured to drive the T1 gimbal. The system was initially setup to provide position commands based on radar data. Since radar data was unavailable at launch, the DT TALO clock was started manually and gimbal commands generated from a preloaded ephemeris.

The Advanced Modular Tracker (AMT) was configured to provide track errors for generation of commands to the FSM. Track errors and input-camera selection information was communicated to the DT via SCRAMnet reflective memory cards installed in each system.

#### **3.3 Data Acquisition**

Video Optical Disk Recorders (VODR) were configured to record data from 4 cameras: the IB, Laser, WFOV, and NFOV. VCR's were used to record the 500 mm Boresight and the video output of the AMT. IRIG B was recorded on one of the audio channels of each VODR. Frame numbers and recording duration are detailed in Appendix A.

Analog data was recorded at 1000 samples per second for 600 seconds. Tracker specific data was downloaded from the DT and AMT post mission. DT data is written to disk asynchronously. AMT data is written to disk at a rate of 60 times per second. Appendix D details the signals available from each source.

#### 4.0 CAMERA CALIBRATION

Prior to launch, several stars were imaged in order to provide both radiometric and angular calibration of the cameras. Radiometric calibrations were made by pointing T1 at a star with known spectral characteristics. Once the star was imaged in each camera, 30 frames (1 second) of video was recorded from each camera onto video optical disk. Angular calibration involved bringing a double star with a known angular separation into the field of view of each camera. 30 frames of video are then stored. During pre-Tigress II calibrations a problem with the angular calibration method was discovered. The angular separations of the available double stars were too wide for all but the IB camera. To solve this problem, a bright single star was moved into the field of view of the NFOV camera. The star was repositioned to several locations within the FOV of the camera while video data was simultaneously acquired from all cameras. This method limits the accuracy of the subsequent calibrations to the angular resolution of the camera calibrated using the double star method (in this case the IB).

### 5.0 TIMELINE OF MISSION EVENTS

T - 60 min.	Lasers, propagated to 4 km targetboards for final alignment.
T - 90 min.	Camera calibration.
T - 5 sec.	A/D and VODR recording started.
T - 0 sec.	Liftoff at 10:17:20 ZULU. Radar not enabled. Initial track from ephemeris. DT TALO clock started manually.
T + 33 sec.	Radar enabled but not used.
T + 39 sec.	Initial booster acquisition by DT on IB camera.
T + 40 sec.	Plume centered in IB by DT. AMT attempting to track on 500 mm BS. AMT loses track when DT centers image.
T + 42 sec.	AMT switches to WFOV. Briefly acquires target and tracks.
T + 45 sec.	Glitch in site VAX causes DT to lose control of MOUNT.
T + 57 sec.	DT switches to radar track but integrated errors cause large track offset. Target not reacquired.
T + 63 sec.	Boost phase ends. Insertion mirrors pulled.
T + 70 sec.	Recording of WFOV, NFOV, Laser camera terminated.
T +380 sec.	DT Data storage terminated.
T +500 sec.	Offsets cleared. Deployed chaff tracked until termination of mount motion.
T +650 sec.	Recording of IB terminated and VCR's stopped. A/D recording stopped.

## 6.0 DISCUSSION OF MISSION EVENTS AND DATA

During the boost phase of the mission, TFE was only able to track for a brief period. this is due to a number of reasons. Figure 1 shows a plot indicating the state of radar information. The radar came online indicated by state 1 at the same time that the DT Operator was first visually acquiring the target. Radar information was not actually used, indicated by state 5, until after track had been lost. The initial track was made using ephemeris data. A fair portion of the boost phase (approximately 15 seconds) was lost because the booster lay just outside the field-of-view (FOV) of the boresight cameras.

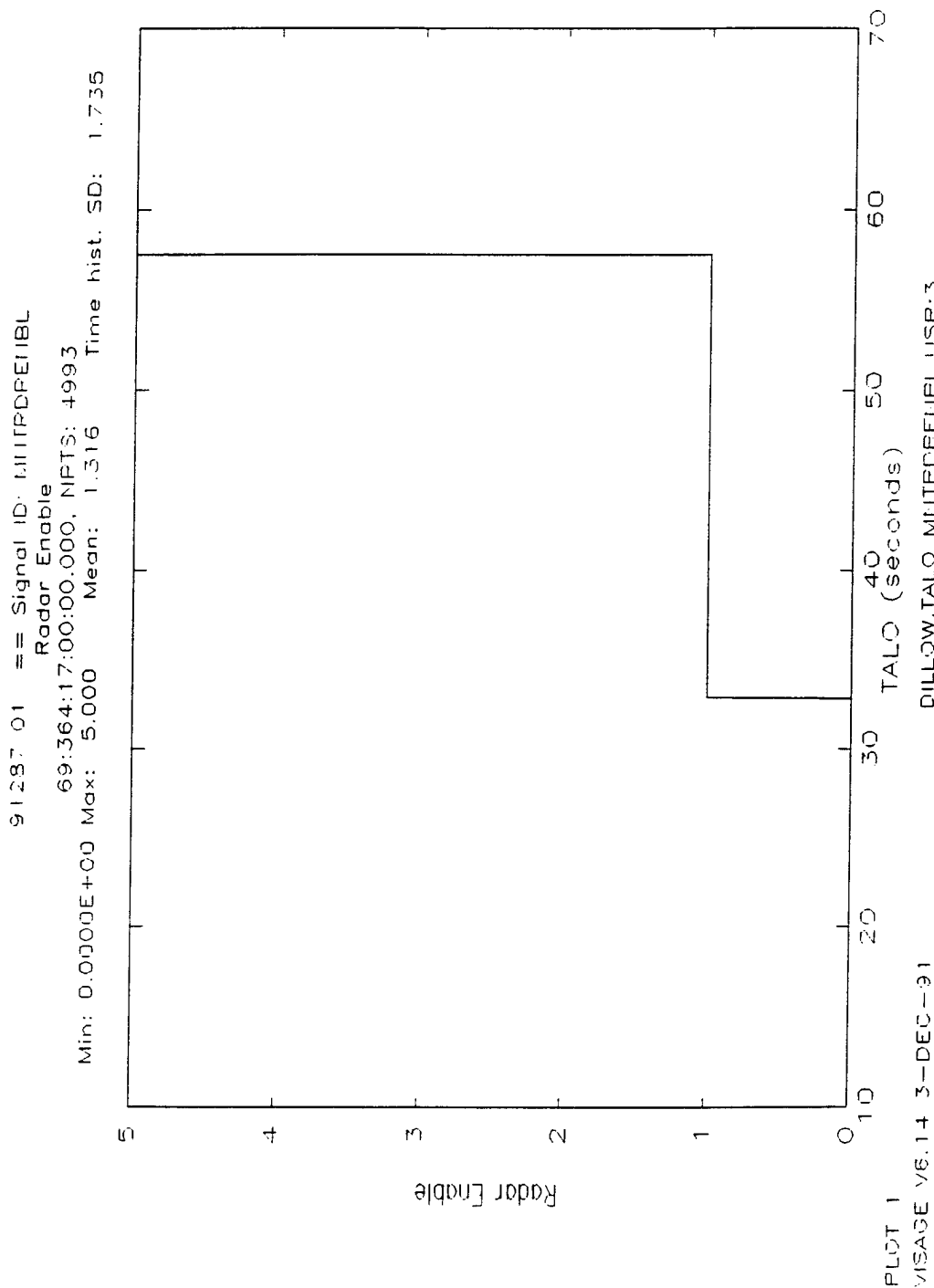
One noticeably absent event in the timeline in Section 4 is the shuttering of the TFE laser beam. Because the DT was never considered "on-track", the site test director never authorized the opening of the T1 cavity shutter. Apparently the test director uses the site VAX as the "on-track" indicator which, in this case, did not accurately reflect the state of the DT during the portion of its track where the target was acquired.

The most severe problem occurred at  $T + 45$ , approximately six seconds after the DT had acquired the booster. The site VAX crashed. This caused the RDAS enable bit to change, terminating the DT's ability to command the gimbal. As the VAX was crashing it apparently sent a brief, erroneous command to the RDAS. This erroneous command moved the mount, removing the booster image from all of the cameras. Figures 2 and 3 illustrate the effect of this problem on the gimbal track. The actual mount position deviates significantly from the position indicated by the radar data. Figure 4 shows the effect on the commands received by the RDAS when the VAX failed.

The plots in Figure 5 show the line of sight errors computed by the DT. From  $T + 39$  to  $T + 45$  seconds it is apparent that the DT had a solid track. At  $T + 45$ , when the booster is pulled out of FOV of the IB, the DT begins to compute errors based on background noise and continues to do so for 6 seconds. Because the DT still thinks it is in track, the computed errors are integrated into the gimbal commands and treated as an update to the ephemeris and radar information. The resultant effect on the gimbal commands is illustrated in Figure 6. The new offset, particularly in azimuth is obvious. This problem was not apparent until later in the mission when control of TI was restored to the DT and no objects could be located. Once the offset was cleared, the DT tracked until the objects became too dim.



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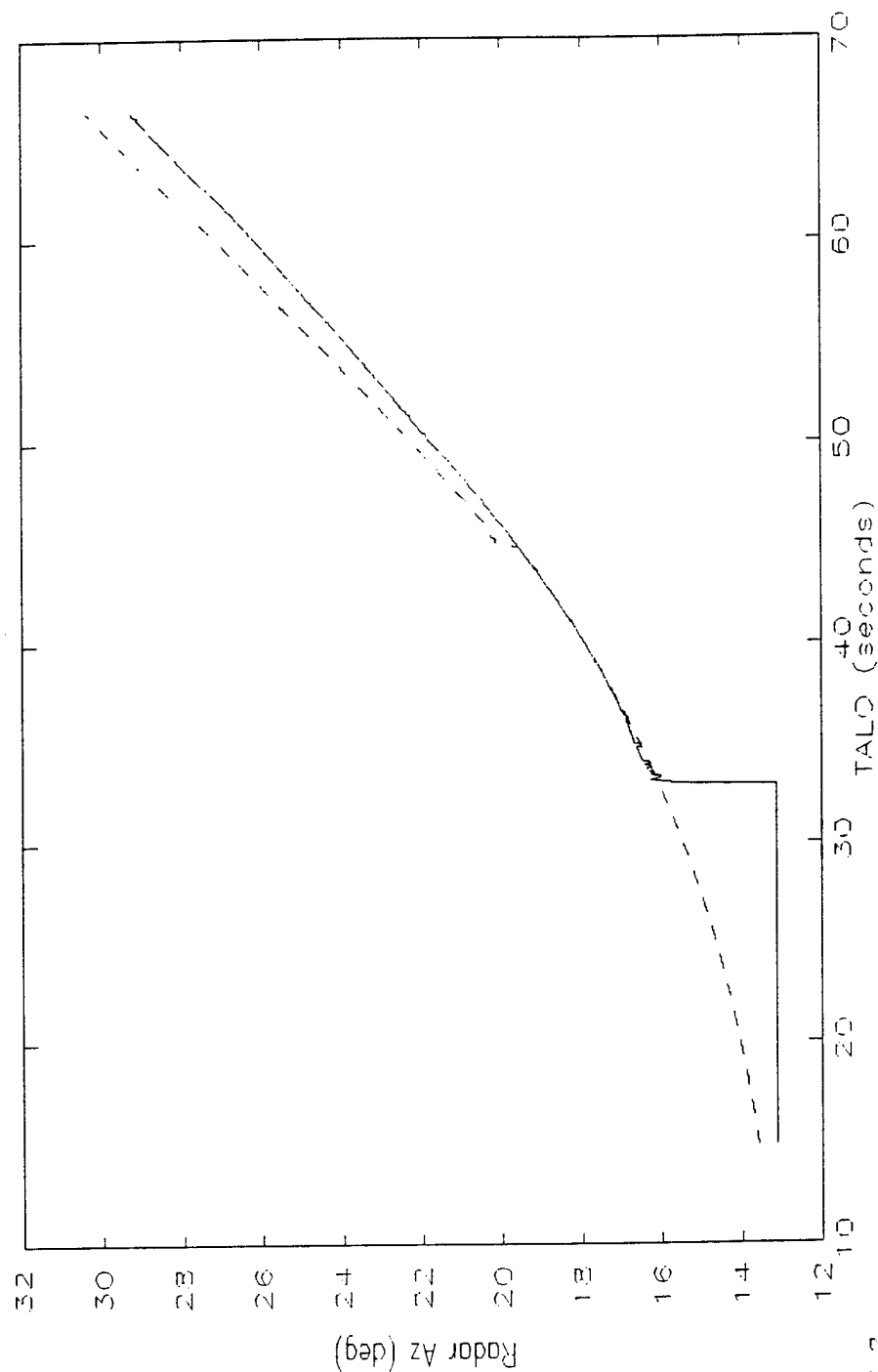


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1. Radar available at T + 33 seconds and used by DT at T + 57 seconds.

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91287\_01 == Signal ID: MNTPADAZ  
91287\_01 == Signal ID: MNTIENCAR



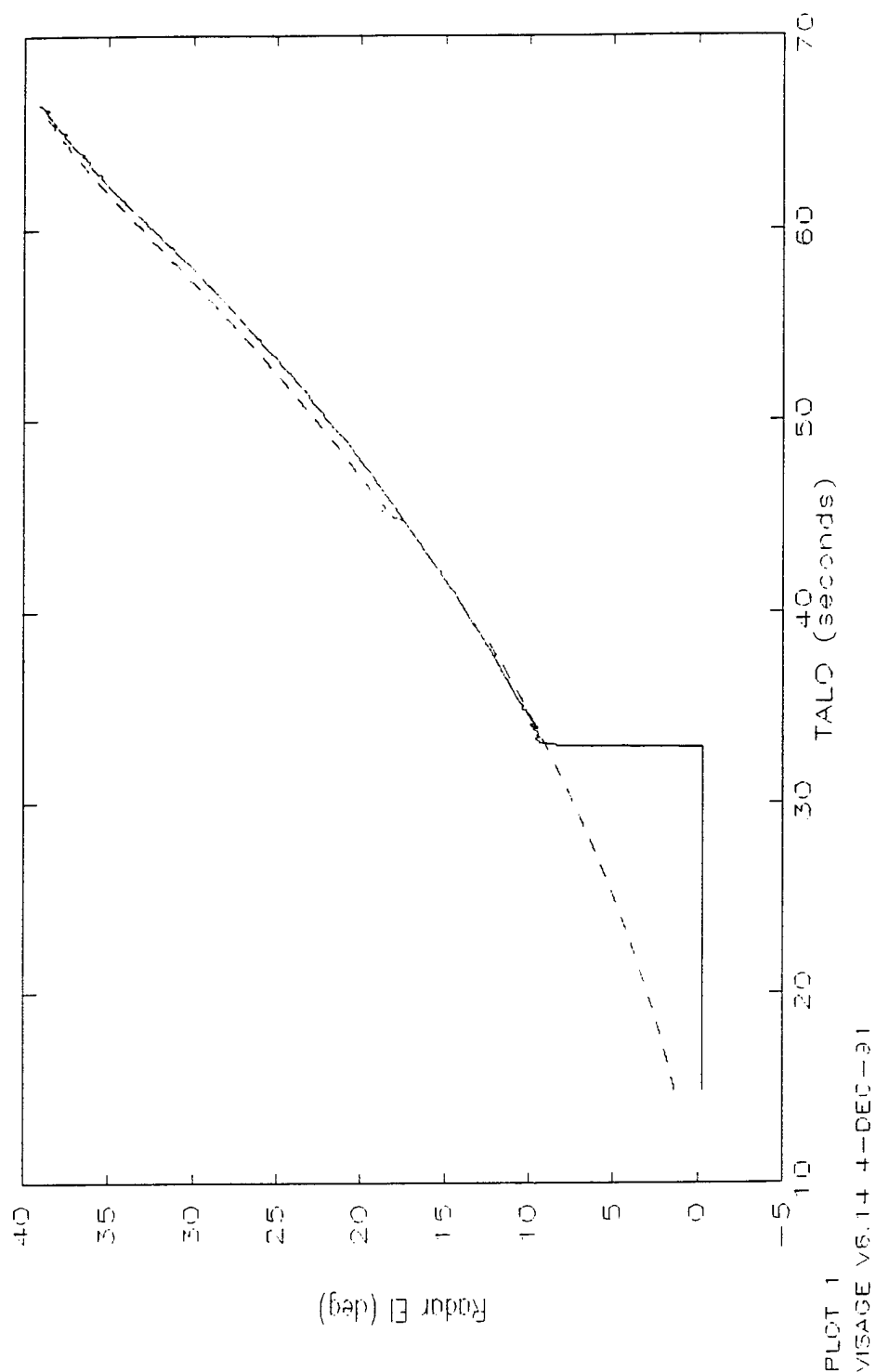
PLOT 2  
VISAGE V6.14 4-DEC-91

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Figure 2. Deviation of gimbal azimuth from radar generated azimuth.

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91287\_01 == Signal ID: MNTPADEL  
91287\_01 == Signal ID: MNTHIENCEL

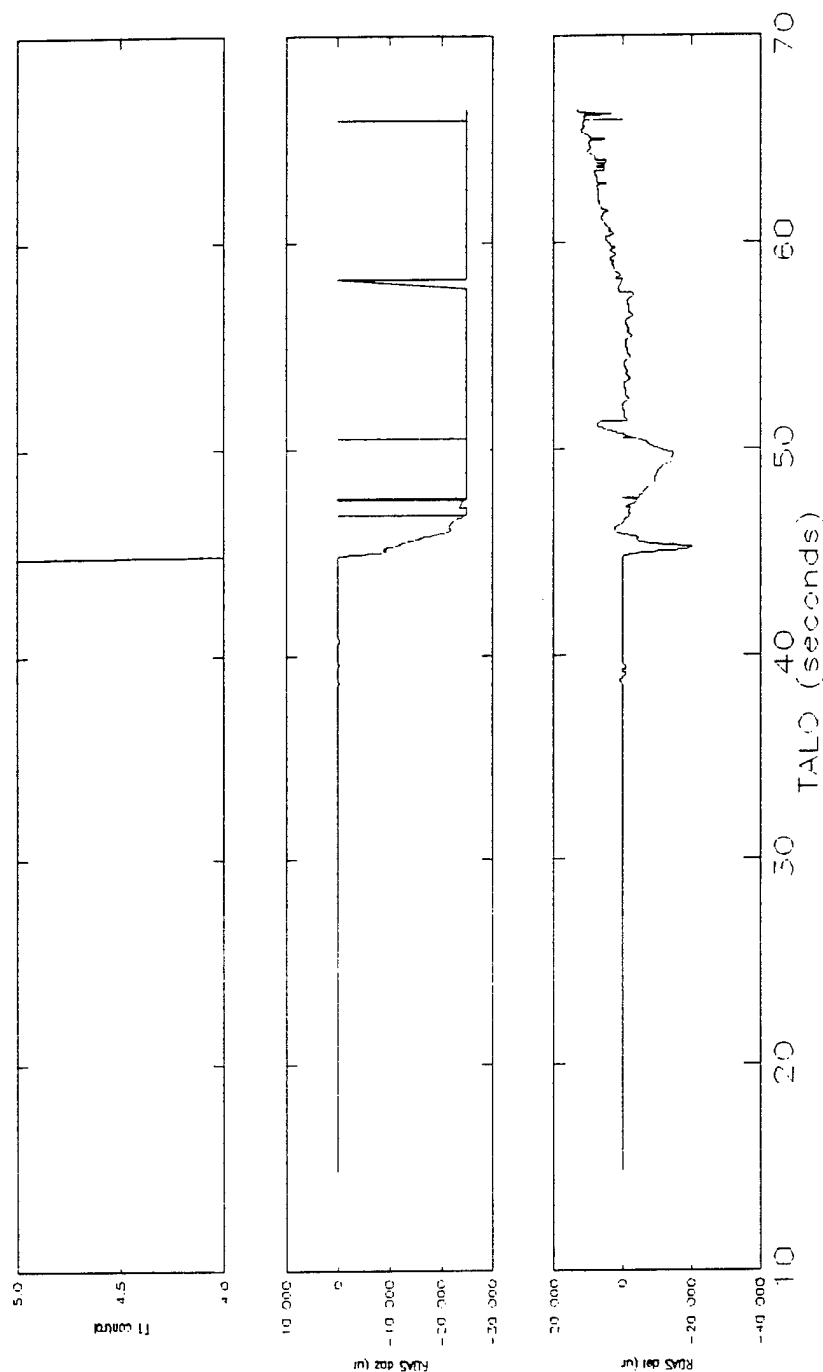


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Figure 3. Deviation of gimbal elevation from radar generated elevation.

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91287 01 == Signal ID: MNIT1CTPL  
91287 01 == Signal ID: MNTRDASDAZ  
91287 01 == Signal ID: MNTRDASDEL



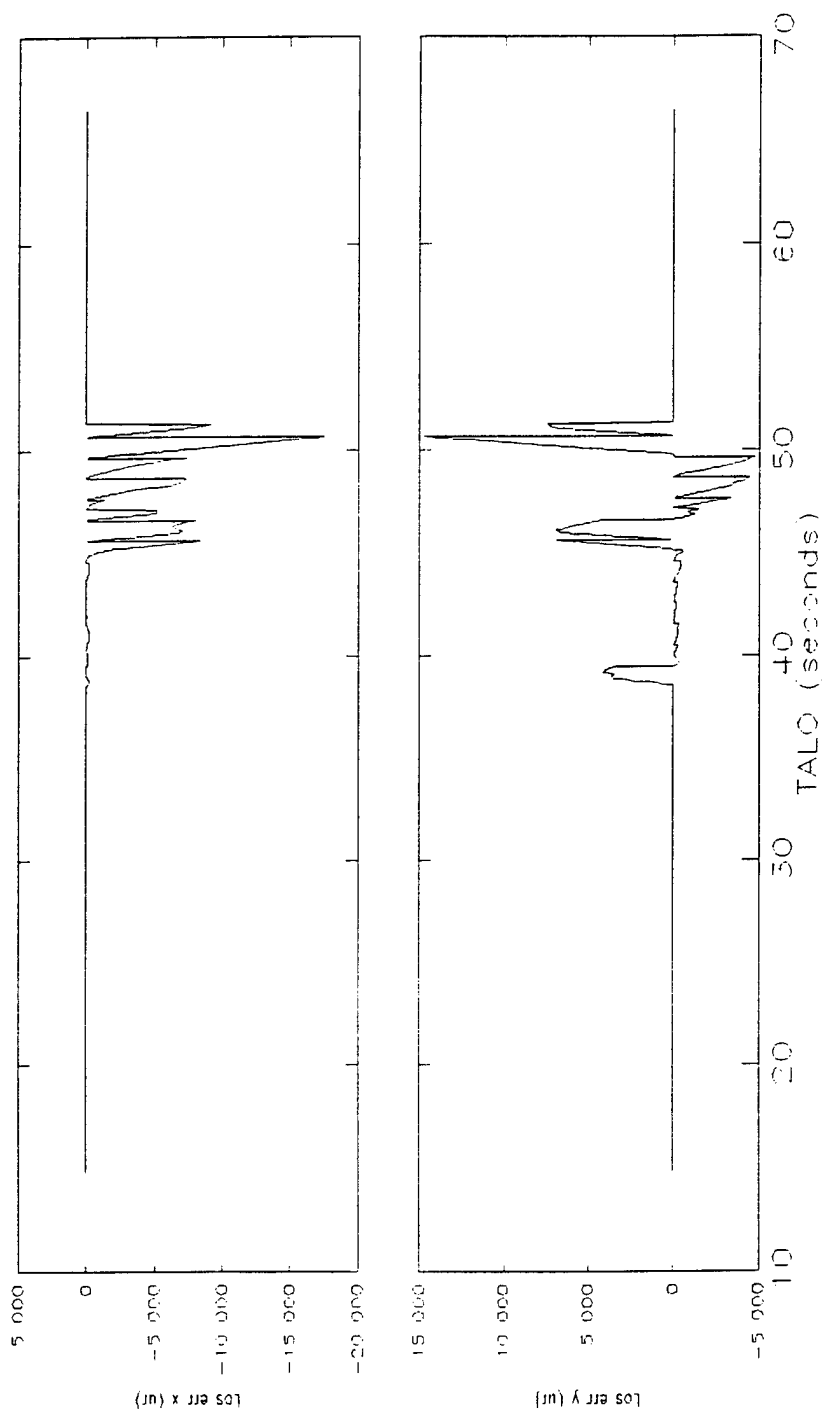
PLOT 4  
VISAGE V6.14 +DEC-31

FOR OFFICIAL USE ONLY

Figure 4. Site VAX failure at T + 45 caused a short, erroneous gimbal command to the RDAS.

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91287 01 == Signal ID: MNTLOSERPX  
91287 01 == Signal ID: MNTLOSERPX



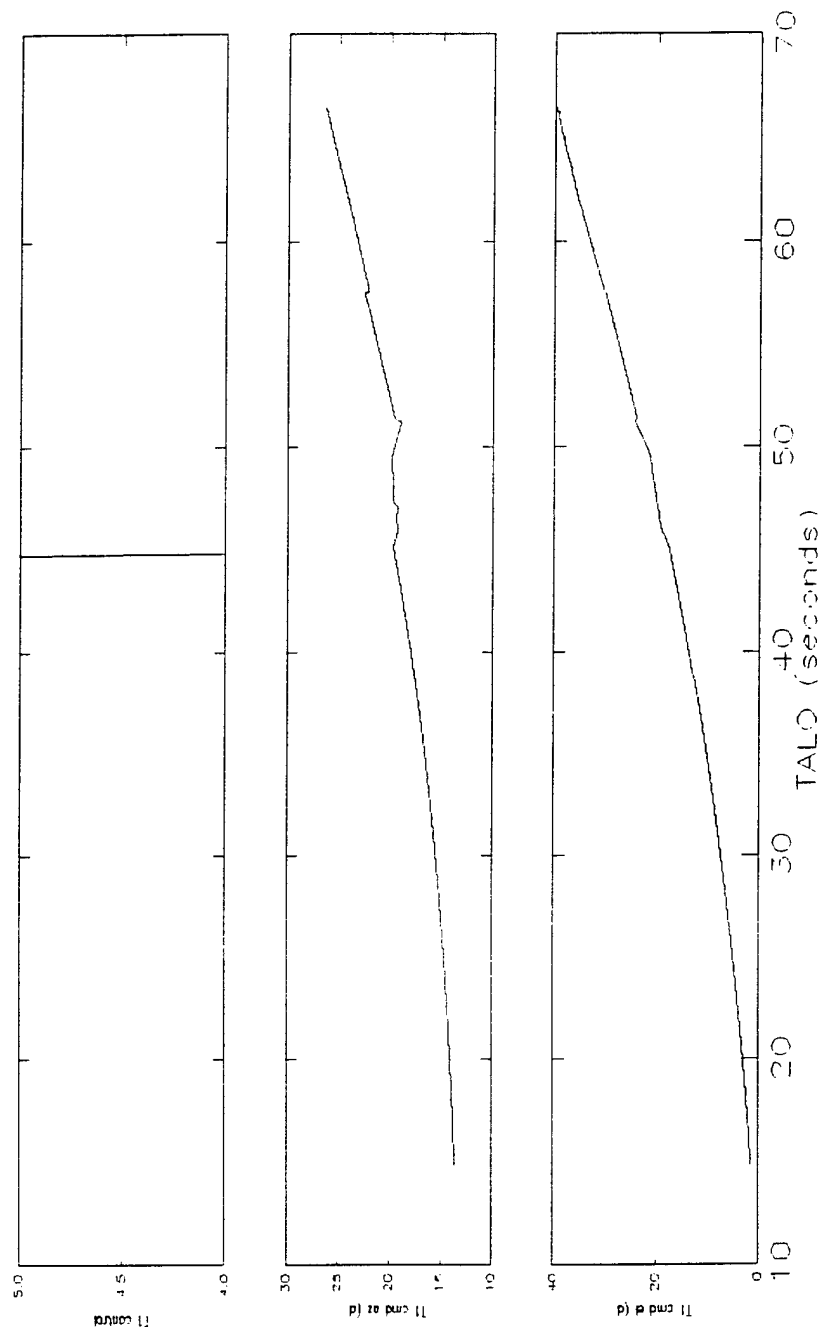
PLOT 3  
VISAGE V6.14 4-DEC-91

FOR OFFICIAL USE ONLY

Figure 5. DT computed line of sight errors.

FOR OFFICIAL USE ONLY

31287 01 == Signal ID: MNTT1CMTPL  
31287 01 == Signal ID: MNTT1CMDAZ  
31287 01 == Signal ID: MNTT1CMDEL



PLOT 3  
VISAGE V6.14 4-DEC-91

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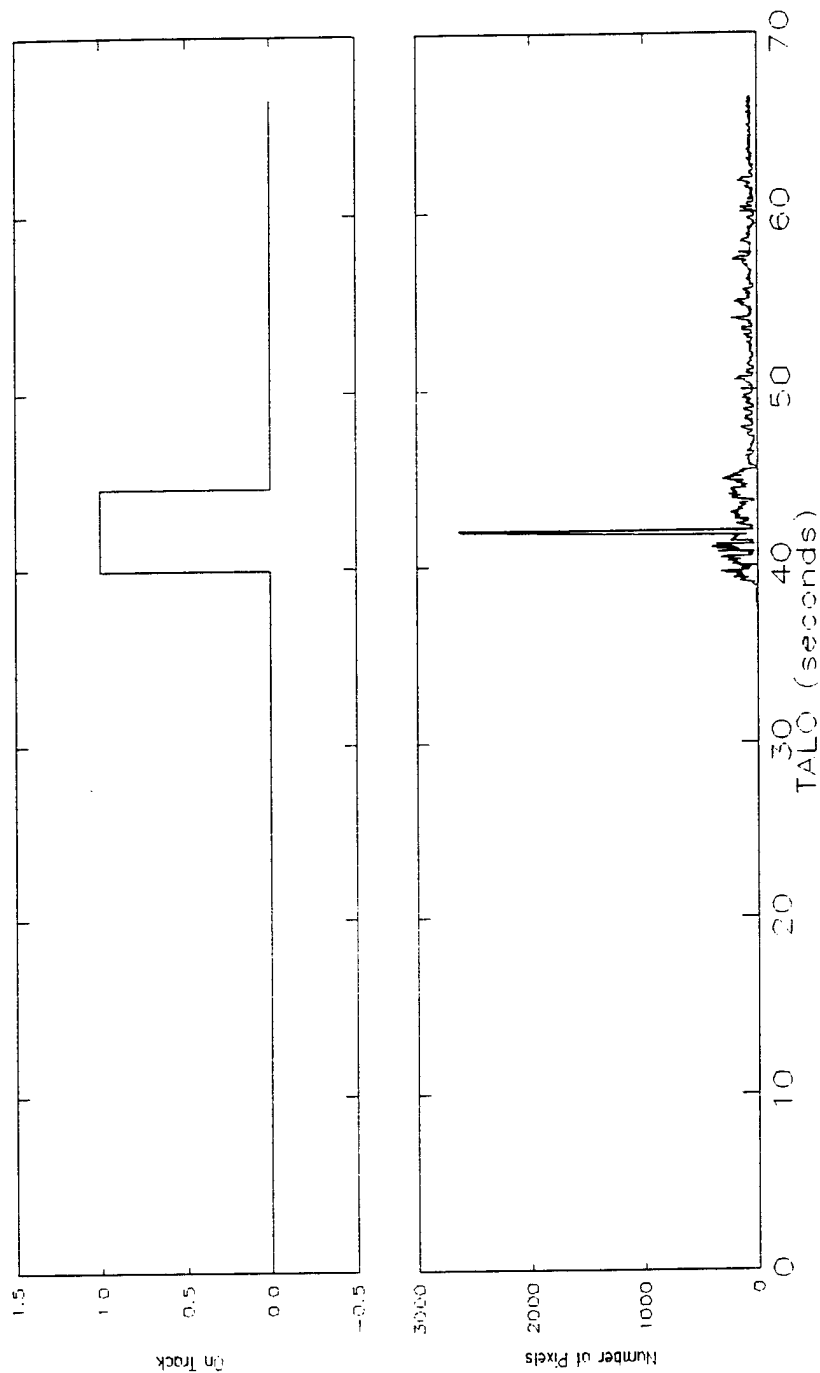
Figure 6. Site VAX failure at T + 45 seconds and its effect on DT generated gimbal commands.

The AMT began the mission looking at the WFOV camera. The operator then switched to the 500 mm BS camera when the DT operator indicated that the booster was being tracked. The booster image was moved to the center of the screen by the DT. At T + 42 seconds the AMT was switched to track the WFOV camera. The target was acquired very briefly before the site VAX failure at T + 45 seconds.

Figure 7 shows the AMT on-track period and the number of pixels above threshold. The large spike indicates where the AMT switched from tracking the 500 mm BS to tracking the WFOV camera. Figure 8 shows the VAX failure at T + 45 and the subsequent loss of track by the AMT.

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31287 01 == Signal ID: AMTONTACK  
31287 01 == Signal ID: AMTCCOUNT



PLOT 1  
VISAGE V6.14 4-DEC-91

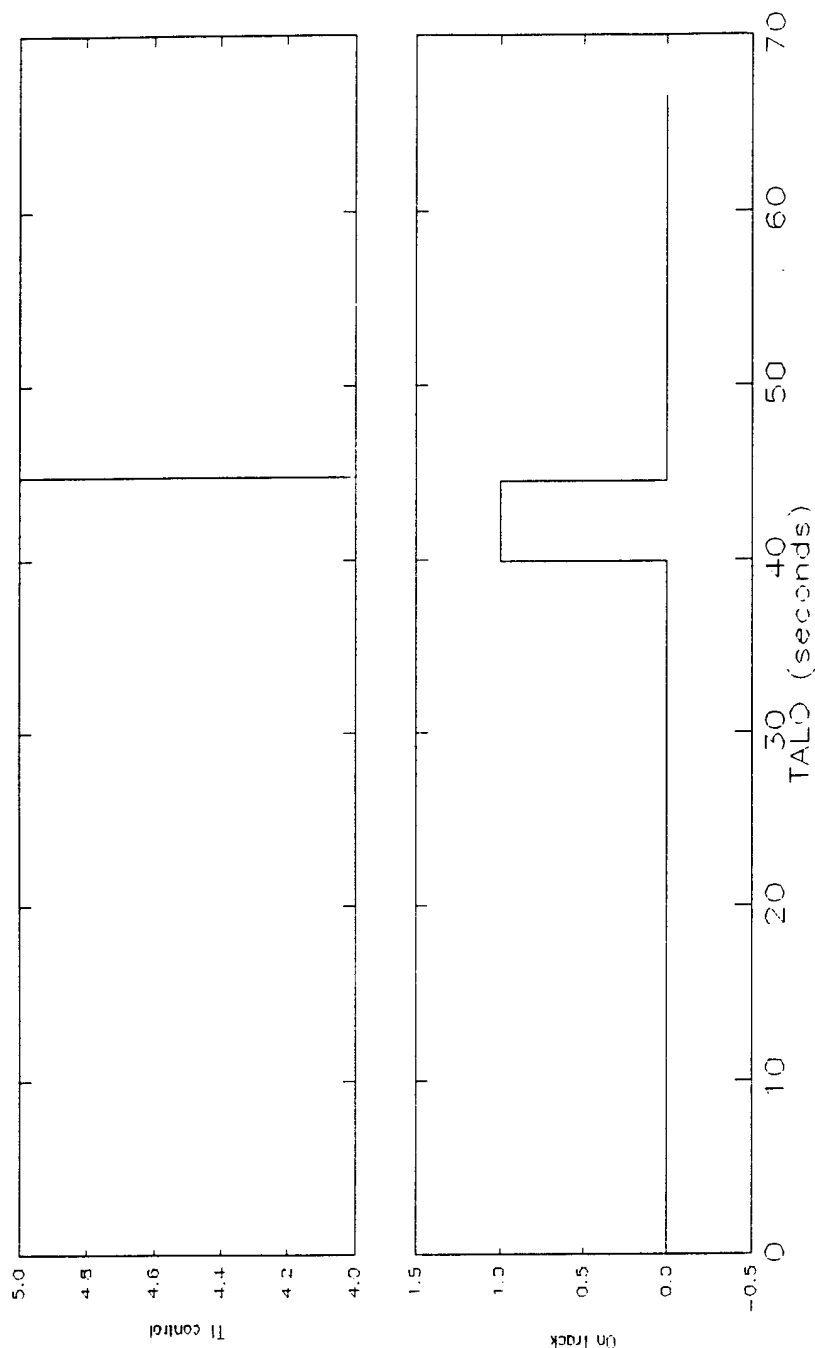
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Figure 7. Number of pixels above threshold during AMT on-track period.



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91287 01 == Signal ID: MNTT1CTRL  
91287 01 == Signal ID: AMTONTACK



PLOT 2  
VISAGE V6.14 4-DEC-91

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Figure 8. Site VAX failure and subsequent mount motion causes AMT loss of track.

## 7.0 CONCLUSIONS

Despite the problems with the site computer, Red Tigress II was the smoothest active mission ever. The optics team was left alone to handle the optics, cameras, and laser. The resultant boresights were so good that when the DT centered the booster image in the IB, the image appeared in all of the cameras, including the NFOV. The IB camera proved to be an excellent acquisition sensor. Where the 500 mm BS could only provide a dim image, the IB was very bright.

Improvements must be made in automation. Although there wasn't much time to track, target acquisition was slow and hampered by the need to manually decide which camera should be tracked.

## APPENDIX A

DATE 10/14/91

## TFE LAUNCH TRACK LOG

SYSTEM TFE MAL TEST\_ID REDTIG INTERVAL 91287.01Launch Vehicle ARIES/MINUTEMAN Mission Number RED TIGRESS  
TALO 10:17:20 ZTarget Type: ☒ Solid Booster ☐ Liquid BoosterVehicle Heading: ☐ SouthEast ☐ East ☒ NorthEastTarget Enhancement NONELaunch Profile SINGLE STAGE, BOOST PHASE ENDS  
AT T + 63 SECONDS

	<u>Azimuth</u>	<u>Elevation</u>	<u>Range</u>
Acquired at:	<u>18°</u>	<u>13°</u>	<u>??</u>
Culmination:	<u>—</u>	<u>—</u>	<u>—</u>
Lost at:	<u>20°</u>	<u>17°</u>	<u>—</u>

☒ Active IlluminationLaser Power        WattsDivergence         $\mu$ radRange Gating: FIXEDVARIABLEBeam and Line of Sight Disruptions☐ Predictive Avoidance       ☐ Aircraft       ☒ Shutter Failure CAVITY SHUTTER NEVER OPENED (SAFETY)☒ Other DT LOST TFE-ENABLE ON RDAS AT  
T+45 SEC DUE TO SITE VAX CRASH

DATE 10/14/91

## TFE LAUNCH TRACK LOG

(cont)

SYSTEM TFEMAL TEST\_ID RESTIG INTERVAL 91287-01Camera Information

<u>Camera</u>	<u>Gain/ND</u>	<u>Spectral Filtering</u>	<u>Tape or Disk #</u>	<u>Start Frame</u>	<u># of Frames</u>
<input type="checkbox"/> Wide Acquisition					
<input checked="" type="checkbox"/> Narrow Acquisition (INTENSIFIED BS)			12-004A	8080	19500
<input checked="" type="checkbox"/> WFOV	1/0	600-900 nm	8-002A	3880	2250
<input checked="" type="checkbox"/> NFOV	1/0	600-900 nm	8-003A	3940	2250
<input checked="" type="checkbox"/> Intensified (Laser)		2μm @ 530 nm	12-003A	9040	2250
<input type="checkbox"/> IR					

☒ PC Data☒ Tracker Data☒ Radar Support☒ EphemerisOther Observation Platforms☒ R1☐ ARGUS☒ R2☐ Other \_\_\_\_\_Weather HAZY/FOGGYTemperature 60°F

Humidity \_\_\_\_\_

Ro \_\_\_\_\_ cm

Cloud Cover: 100% 75% 50% 25% (0%)Mission Summary

500mm BS recorded on VCR 1 } STARTED AT  
 OUTPUT OF AMT recorded on VCR 4 } T-30 sec

- DURING SHORT TRACK OF BOOST, ND FILTER BRIEFLY INSERTED INTO FOV OF WFOV CAMERA
- INTERMITTENT PROBLEMS W/ LIGHTS ON 4K-BOARD
- SITE TEST CONDUCTOR NEVER OPENED LASER SHUTTER
- NO PROBLEMS W/ INSERTION MIRROR
- VODR'S, A/D STARTED AT T-0 sec. OPERATED NORMALLY.

## TFE LAUNCH TRACK LOG

(cont)

SYSTEM TFEMAL TEST\_ID REDTIG INTERVAL 91287-01

## Mission Summary (cont.)

**DT** No radar enable initially. Initial track off of ephemeris. Acquired on IB at T+38 sec. Tracked for approx. 8 seconds until mount jerked image out of FOV. Attempted to reacquire w/ radar data, but site had mount control. Once control was regained, several degrees of error had built up due to sensor noise. Offsets were cleared and track followed radar and payload chaff was acquired on IB. DT data terminated at T+380 sec. TALO clock started manually.

**AMT** Saw dim target in 500mm BS. Started out in wFOV but saw nothing. Moved to 500mm BS but image was very dim. Target relocated to center of screen before track was established. Switched back to wFOV and tried to reacquire (~4 seconds elapsed). Target then disappeared. AMT stored data to disk.

RT TIMELINE\*

TIME	COMPANY	TASK	LOCAL	ZULU
T- 8 HRS	SITE	ALL SITE PERSONNEL REPORT	21:45	1:45
T-8 HRS	TEXTRON	TOP OFF AMBER DEWAR	21:45	1:45
T-8 HRS	SITE	TOP OFF LWIR DEWAR	21:45	1:45
T-7 HRS	SITE	ROLL CALL AND COMM CHECK	22:45	2:45
T-6 HRS	SITE	SENSOR NET COMM CHECK	23:45	3:45
T-6 HRS	SITE	VERIFY REALTIME DATA RECORDING	23:45	3:45
T-6 HRS	SITE	LEVEL AND ALIGN MIRRORS IN T1	23:45	3:45
T-6 HRS	SITE	STAR CALS ALL MOUNTS	23:45	3:45
T-6 HRS	FTI	BEGIN PHOTOMETER CALS	23:45	3:45
T-6 HRS	T1/T2	BOARD WORDS THROUGH MIRRORS	23:45	3:45
T-6 HRS	J C	JOHNSON CONTROLS SHIFT CHANGE	23:45	3:45
T-5 HRS	TFE	REPORT TIME	0:45	4:45
T-5 HRS	SITE/TFE	IN BUILDING LASER ALIGNMENT	0:45	4:45
T-4.5 HRS	TFE	T1 OPTICS ALIGNED	1:15	5:15
T-4 HRS	TFE	TI CONTROL SYSTEM VERIFIED	1:45	5:45
T-4 HRS	TFE	INSERTION MIRROR OUT	1:45	5:45
T-4 HRS	SITE	ALEXANDRITE LASER ON BOARDS	1:45	5:45
T-4 HRS	TFE	INSTALL INSERTION MIRROR	1:45	5:45
T-4 HRS	TFE	TFE BOARD WORDS	1:45	5:45
T-4 HRS	TFE	TFE LASER ON BOARDS	1:45	5:45
T-4 HRS	SITE	WEATHER BRIEFING ON SENSOR NET	1:45	5:45
T-3.5 HRS	TFE	SENSOR ALIGNMENT,FOV MEASUREMENTS	2:15	6:15
T-3 HRS	TFE	INTERNAL LASER ALIGNMENT/GATING	2:45	6:45
T-3 HRS	FTI	PHOTOMETER SINGLE STAR EXTINCTION	2:45	6:45
T-2.6 HRS	SITE	ETR THEO ON LINE		
T-2.5 HRS	SITE	SATELLITE TRACK OBJ 6155		7:50
T-2.5 HRS	TFE	VISIBLE&IR SENSOR CALS	3:15	7:15
T-2.5 HRS	J C	JOHNSON CONTROLS SHIFT CHANGE	3:15	7:15
T-2.25 HRS	SITE	VERIFY REALTIME RECORDING	3:30	7:30
T-2 HRS	TFE	ALL HANDS READINESS REVIEW	3:45	7:45
T-2 HRS	R1	SONY 750 STAR CAL	3:45	7:45
T-102 MIN	SITE	SATELLITE PASS ON RANGE	4:03	8:03
T- 100 MIN	R1	3.5 AND A FOCUS STAR CALS	4:05	8:05
T-90 MIN	SITE	THEORETICAL ON LINE	4:15	8:15
T-90 MIN	R2	PHOTOMETER EXTINCTION ALL SKY	4:15	8:15
T-90 MIN	T1/T2	VERIFY BOARD WORDS	4:15	8:15
T-75 MIN	T1	ALEXANDRITE ON BOARDS	4:30	8:30
T-75 MIN	TFE	REINSTALL INSERTION MIRROR	4:30	8:30
T-70 MIN	TFE	BOARD WORDS	4:35	8:35
T-60 MIN	TFE	TFE LASER ON BOARDS	4:45	8:45
T-45 MIN	SITE	COMM CHECK ALL SITE DUTY POSITIONS	5:00	9:00
T-45 MIN	SITE	RAPCON COMM CHECK	5:00	9:00
T-45 MIN	TEXTRON	TOP OFF AMBER DEWAR	5:00	9:00
T-45 MIN	TEXTRON	AMBER SENSOR CAL	5:00	9:00
T-45 MIN	SITE	TFE ILLUMINATE STAR	5:00	9:00

RT TIMELINE\*

T-42	SITE	BACKUP SATELLITE PASS OBJ 6155		
T-30 MIN	SITE	STATUS CALL FROM ISTEf	5:15	9:15
T-30 MIN	SITE	WEATHER BRIEFING ON SENSOR NET	5:15	9:15
T-30 MIN	FTT	PHOTOMETER ALL PATH, DARK COUNTS	5:15	9:15
T-30 MIN	TFE	VERIFY SENSOR BORESIGHT	5:15	9:15
T-25 MIN	SITE	SENSOR WEATHER REPORT	5:20	9:20
T-20 MIN	SITE	PROBABILITY OF SUCCESS ON SENSOR NET	5:25	9:25
T-20 MIN	TFE	IR & VISIBLE STAR CAL	5:25	9:25
T-15 MIN	FTT	FTT READY	5:30	9:30
T-10 MIN	SITE	READY VERIFICATION ON SENSOR NET	5:35	9:35
T-10 MIN	R2	LWIR PRECAL	5:35	9:35
T-5 MIN	SITE	VERIFY ALL MOUNT STATUS	5:40	9:40
T-70 SEC	TC	LOAD LAUNCH THEORETICAL	5:43	9:43
T-60 SEC	SITE	ALL MOUNTS VERIFIED ON LAUNCH POINT	5:44	9:44
T-20 SEC	SITE	VIDEO & DIGITAL RECORDING STARTED	5:44	9:44
T-0		LAUNCH AT 1017 ZULU	5:45	9:45
T+20 SEC	SITE	CONFIRM TARGET ACQ.		
T+63 SEC		END BOOST PHASE		
T+70 SEC	TFE	REMOVE INSERTION MIRROR		
T+75 SEC		BOOSTER/PAYLOAD SEPARATION		
T+85 SEC		PAYLOAD/NOSE CONE SEPARATION		
T+90 SEC	WAYNE	START SIMULATION TAPE		
T+120 SEC	SITE	LASERS READY		
T+140 SEC		DEPLOY RESIDUAL INFLATABLES		
T+160 SEC		DEPLOY INFLATABLE CONFORMAL		
T+180 SEC		DEPLOY ERECTABLE CONFORMAL		
T+185 SEC		DEPLOY NON-CONFORMAL		
T+285 SEC		DEPLOY CALIBRATION SPHERES		
T+300 SEC		DEPLOY ELECTRO-OPTICAL CHAFF		
T+650 SEC	SITE	CONFIRM END OF MISSION		
T+656 SEC		REENTRY		
T+15 MIN	SITE	POST CALS		
T+15 MIN	R2	LWIR POSTCAL		
T+15 MIN	T2	LASER ILLUMINATE STAR		
T+1 HR	ALL	DATA TURN IN		
T+1 HR	SITE	POST MISSION CALS COMPLETE		
T+3 HRS	ALL	MISSION REVIEW		
T+1 DAY	ALL	POST MISSION REVIEW @ SITE 0830L		



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91287 01 == Signal ID: MNTT1ENCAZ

T1 enc az (deg)

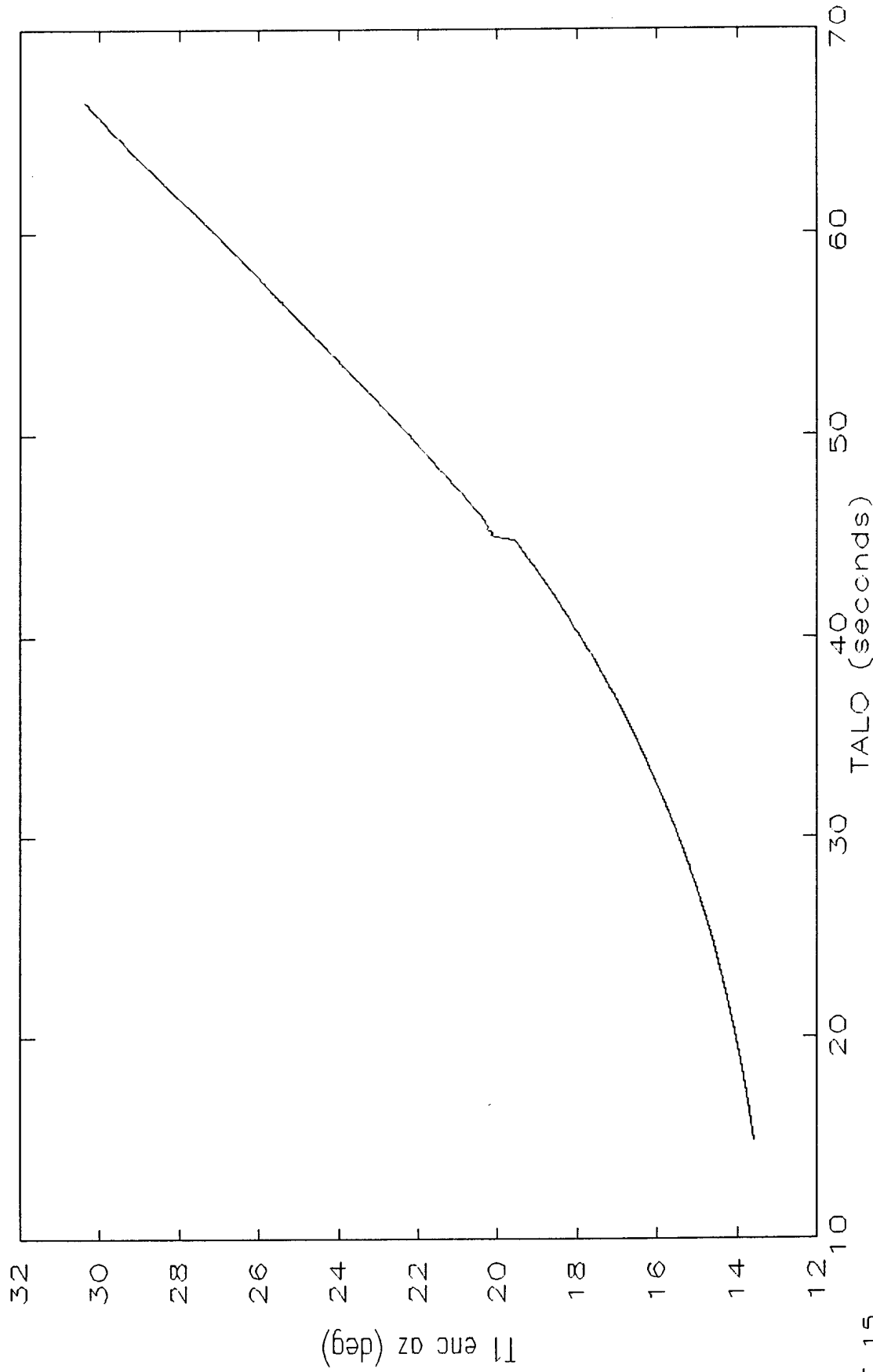
00:000:00:00:00:00, NPTS: 4993

Max: 30.37

Mean: 19.65

Time hist. SD: 5.185

Min: 13.59



PLOT 15

VISAGE V6.14 3-DEC-91

DILLOW.TALO MNTT1ENCAZ.USR;1

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91287 01 == Signal ID: MNTT1ENCEL

T1 enc el (deg)

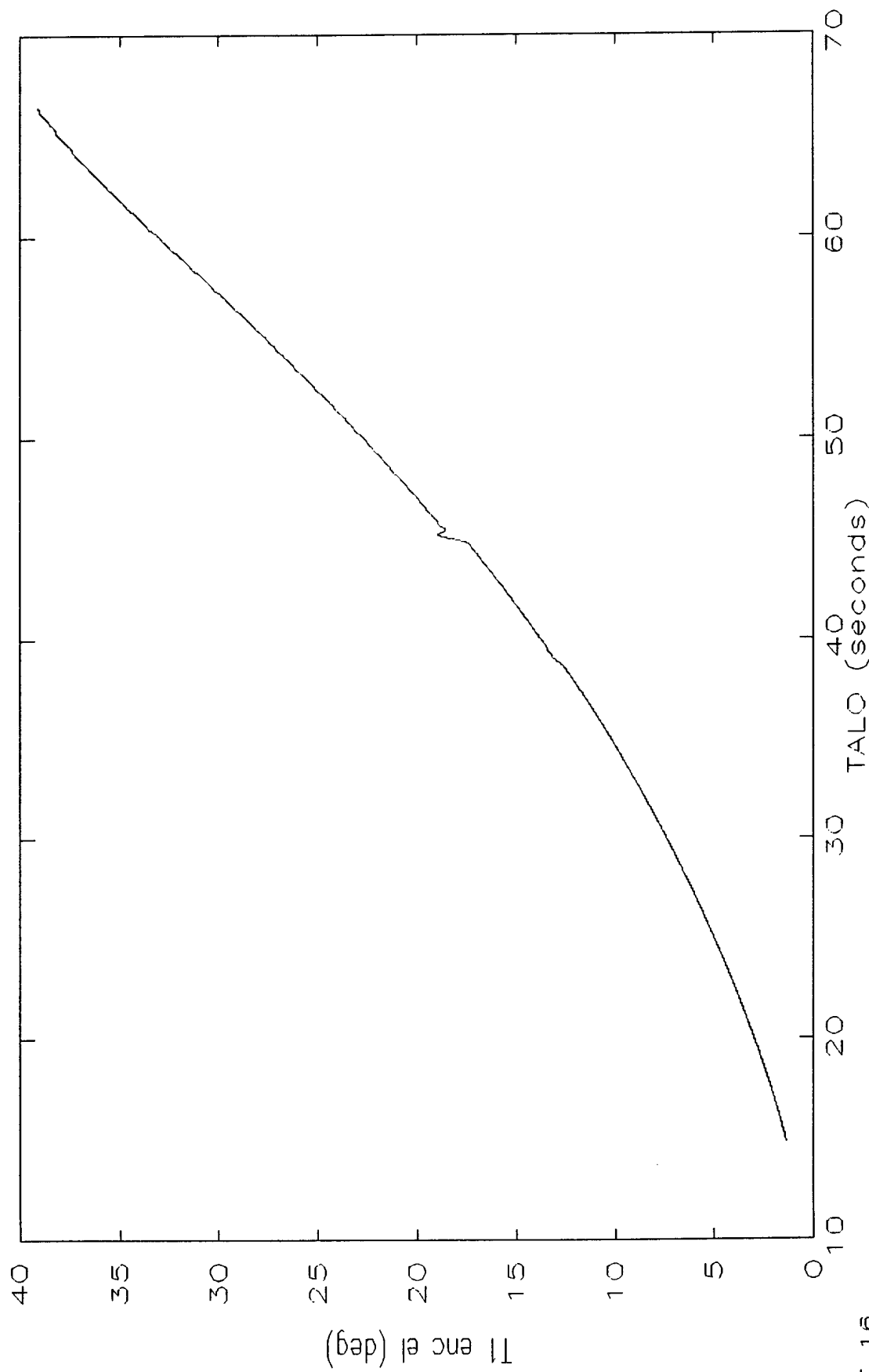
00:000:00:00:00.000, NPTS: 4993

Max: 39.11

Mean: 16.51

Time hist. SD: 11.62

Min: 1.377



PLOT 16

VISAGE V6.14 3-DEC-91

DILLOW.TALO MNTT1ENCEL.USR;1

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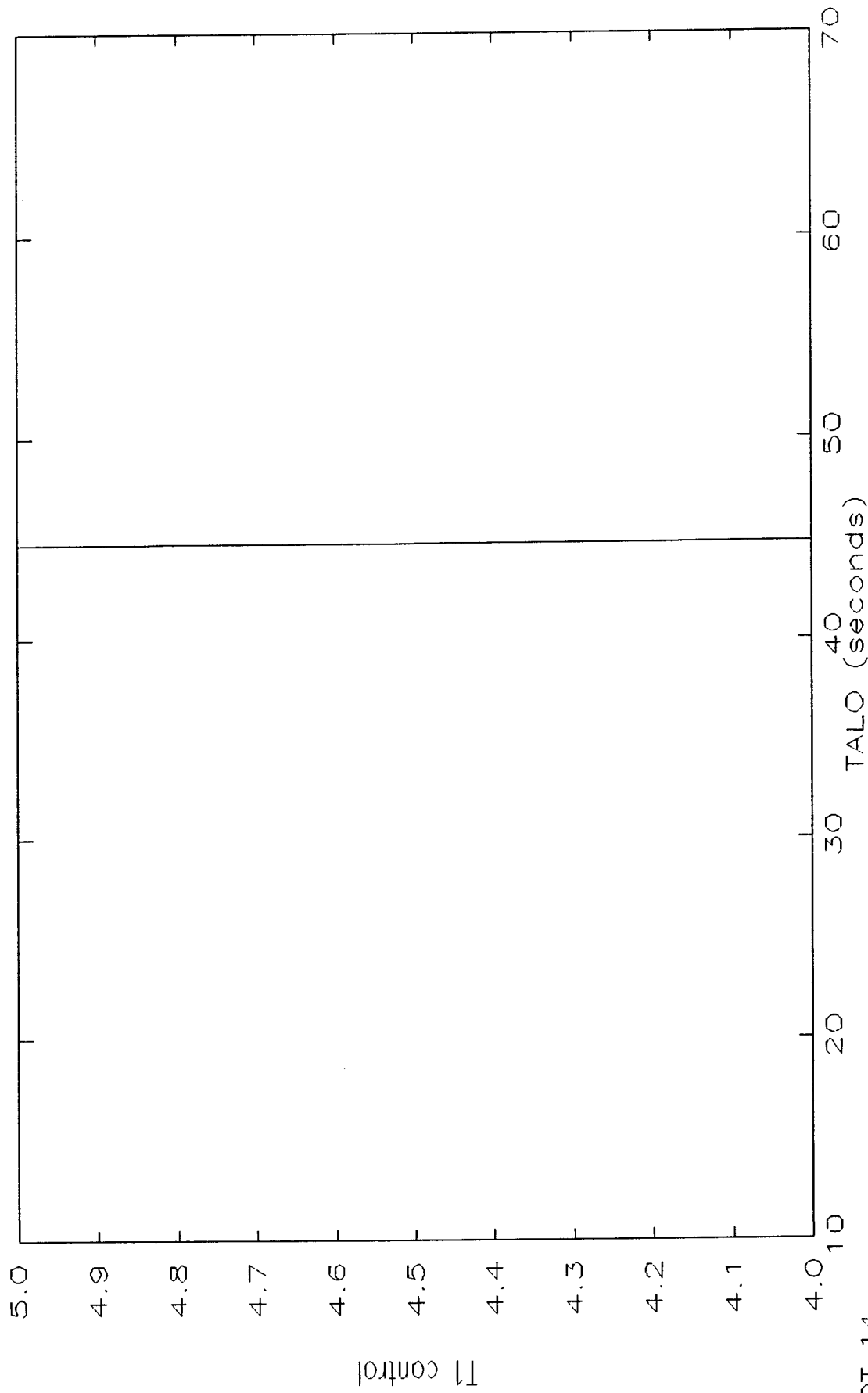
FOR OFFICIAL USE ONLY

91287 01 == Signal ID: MNTT1CTRL

T1 control

00:000:00:00:00.000, NPTS: 4993

Min: 4.000 Max: 5.000 Mean: 4.582 Time hist. SD: 0.4932



PLOT 14

VISAGE V6.14 3-DEC-91

DILLOW.TALO MNTT1CTRL.USR;1

FOR OFFICIAL USE ONLY

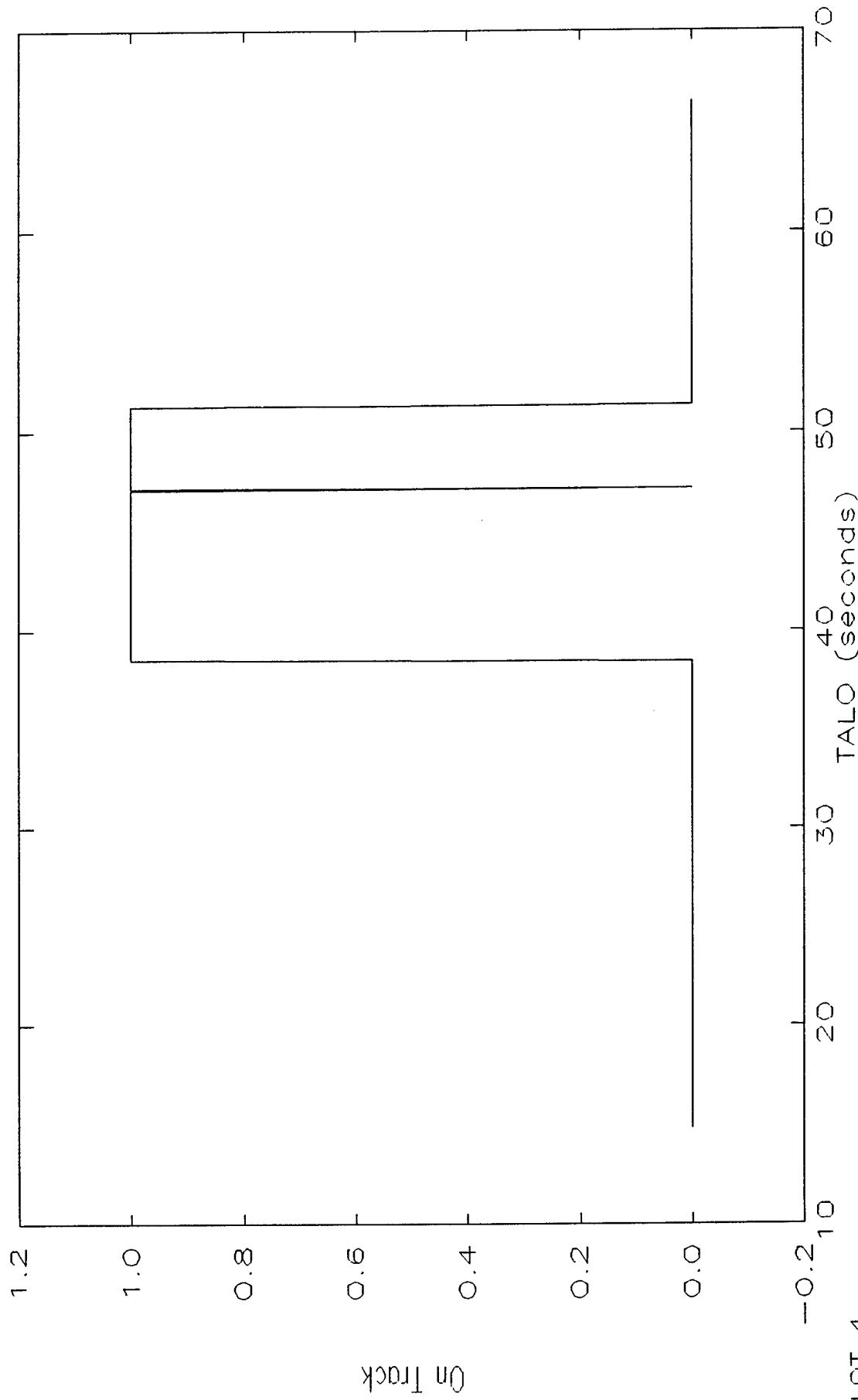
FOR OFFICIAL USE ONLY

91287 01 == Signal ID: MNTONTRK

On Track

00:000:00:00:00.000, NPTS: 4993

Min: 0.0000E+00 Max: 1.000 Mean: 0.2437 Time hist. SD: 0.4293



PLOT 4

VISAGE V6.14 3-DEC-91

DILLOW.TALO MNTONTRK.USR;1

FOR OFFICIAL USE ONLY

FOR OFFICIAL USE ONLY

91287 01 == Signal ID: MNTT1CMDAZ

T1 cmd az (deg)

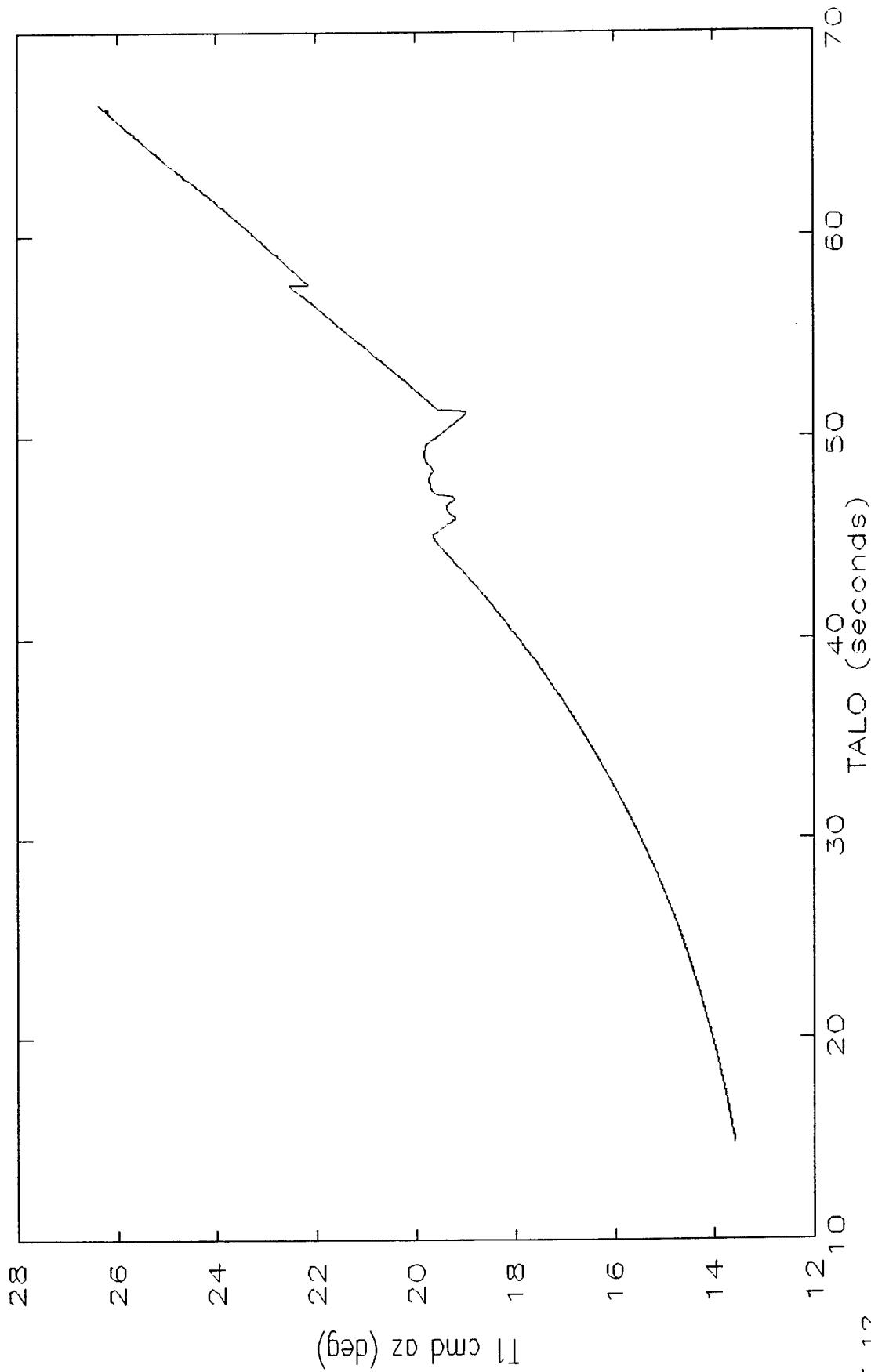
00:00:00:00:00.000, NPTS: 4993

Max: 26.36

Mean: 18.34

Min: 13.59

Time hist. SD: 3.637



PLOT 12

VISAGE V6.14 3-DEC-91

DILLOW.TALO MNTT1CMDAZ.USR;1

FOR OFFICIAL USE ONLY

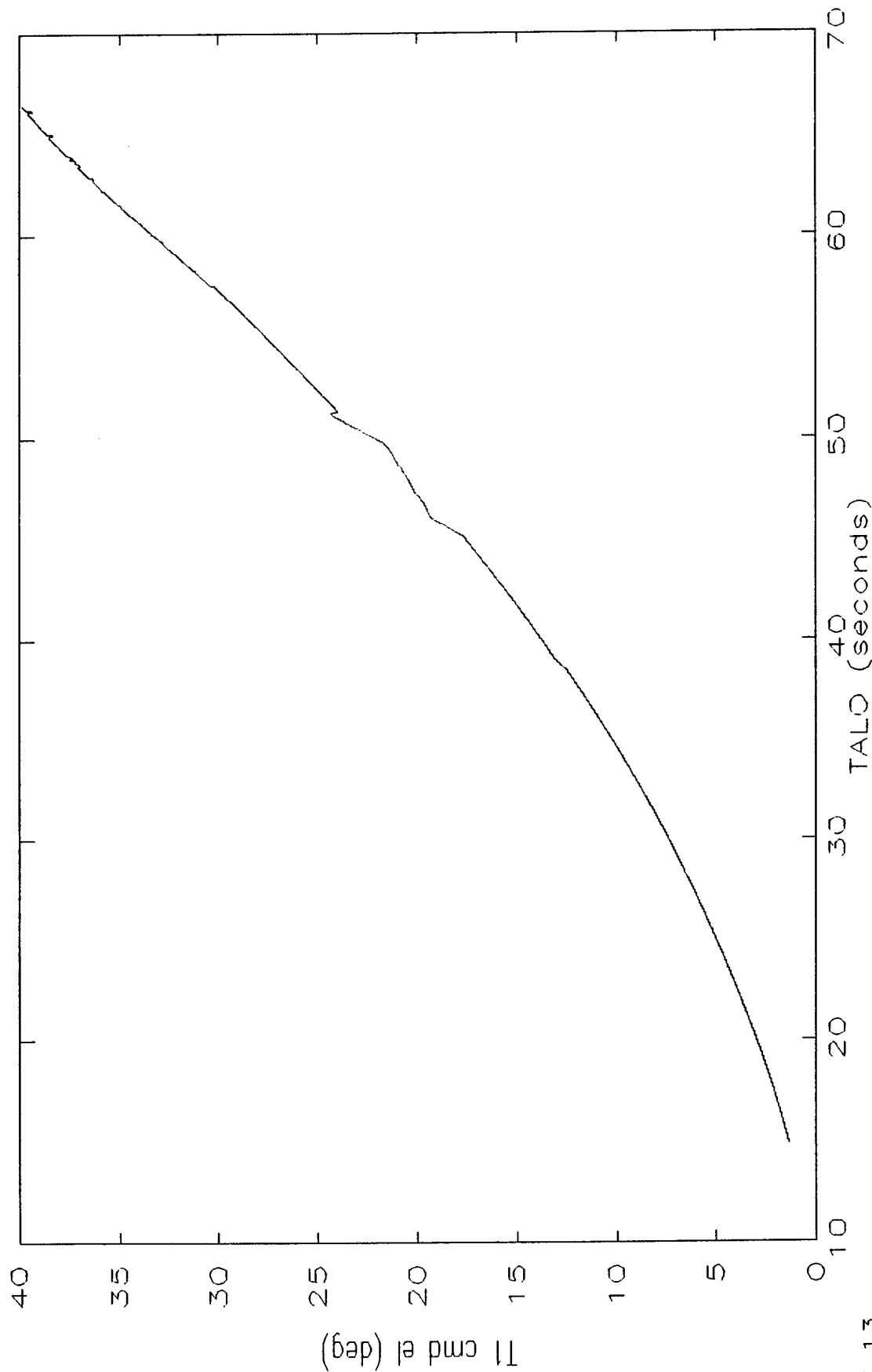
FOR OFFICIAL USE ONLY

91287 01 == Signal ID: MNTT1CMDEL

T1 cmd el (deg)

00:000:00:00:00.000, NPTS: 4993

Min: 1.374 Max: 39.87 Mean: 16.53 Time hist. SD: 11.71



PLOT 13

VISAGE V6.14 3-DEC-91

DILLOW.TALO MNTT1CMDEL.USR;1

FOR OFFICIAL USE ONLY

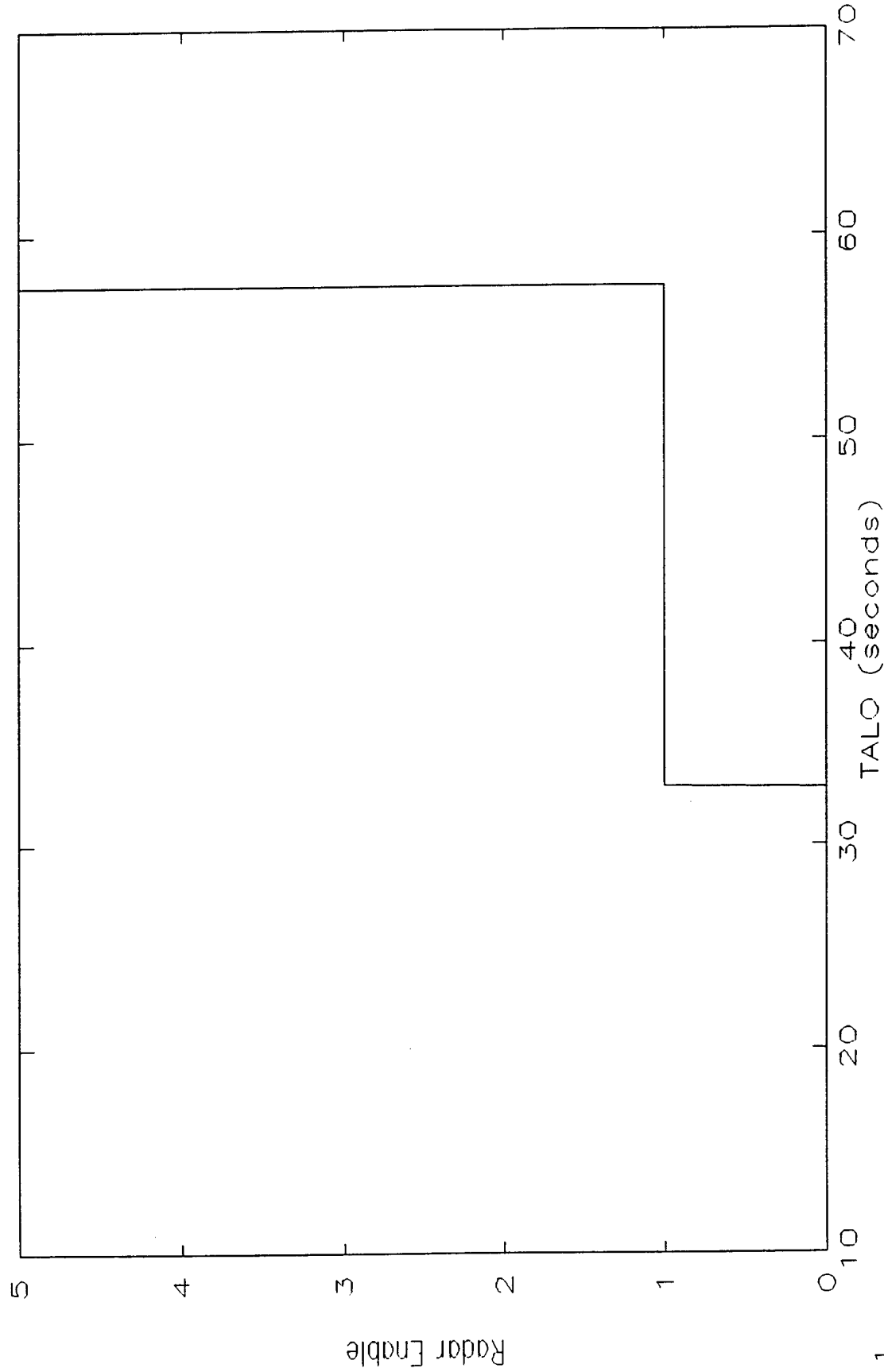
FOR OFFICIAL USE ONLY

91287 01 == Signal ID: MNTDRENBL

Radar Enable

69:364:17:00:00.000, NPTS: 4993

Min: 0.0000E+00 Max: 5.000 Mean: 1.316 Time hist. SD: 1.735



PLOT 1

VISAGE V6.14 3-DEC-91

DILLOW.TALO MNTDRENBL.USR:3

FOR OFFICIAL USE ONLY

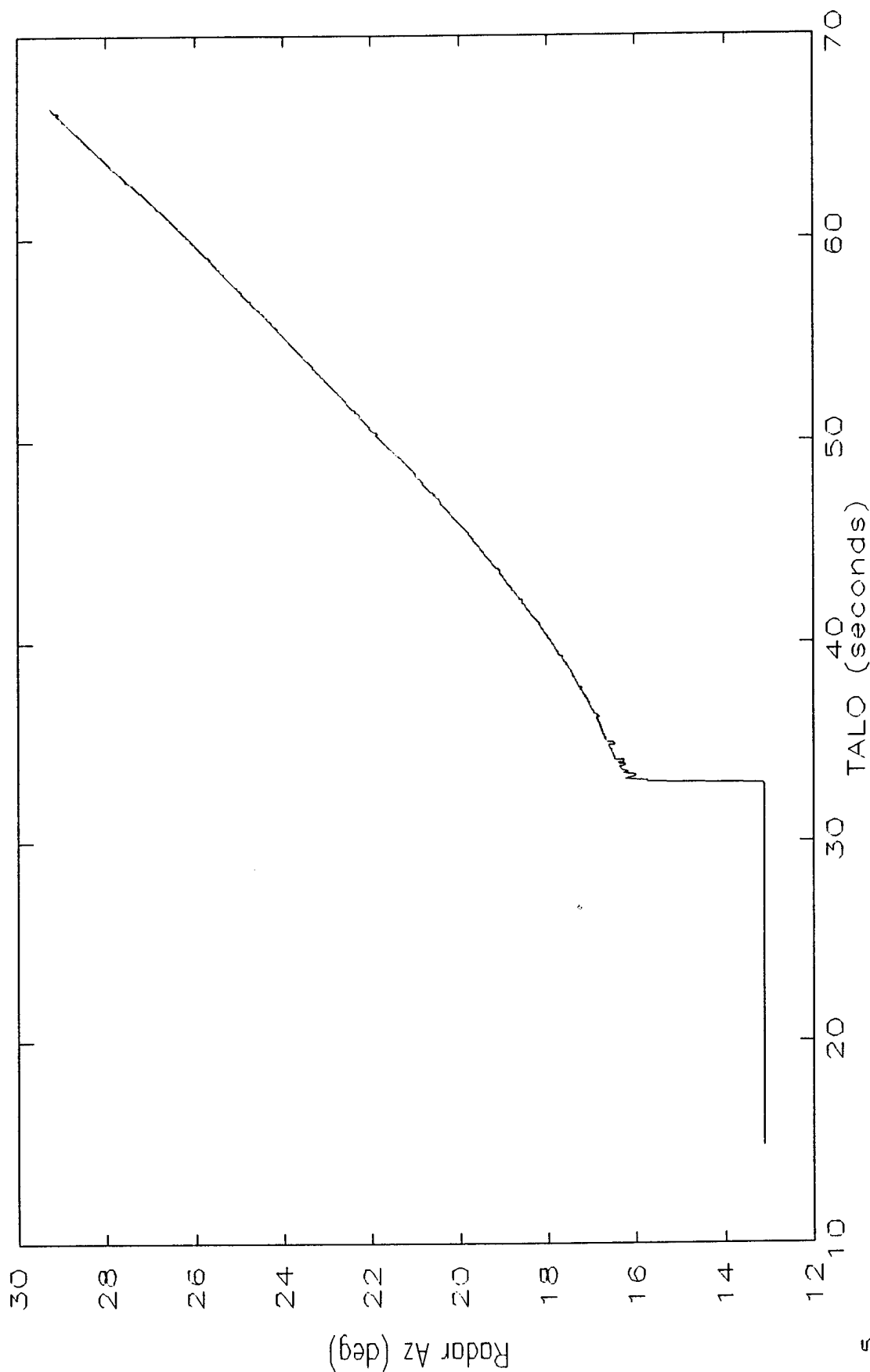
FOR OFFICIAL USE ONLY

91287 01 == Signal ID: MNTRADAZ

Radar Az (deg)

00:000:00:00:00.000, NPTS: 4993

Min: 13.13 Max: 29.26 Mean: 18.79 Time hist. SD: 5.323



PLOT 5

VISAGE V6.14 3-DEC-91

TALO (seconds)

DILLOW.TALO MNTRADAZ.USR;1

FOR OFFICIAL USE ONLY



FOR OFFICIAL USE ONLY

91287 01 == Signal ID: MNTRADEL

Radar EI (deg)

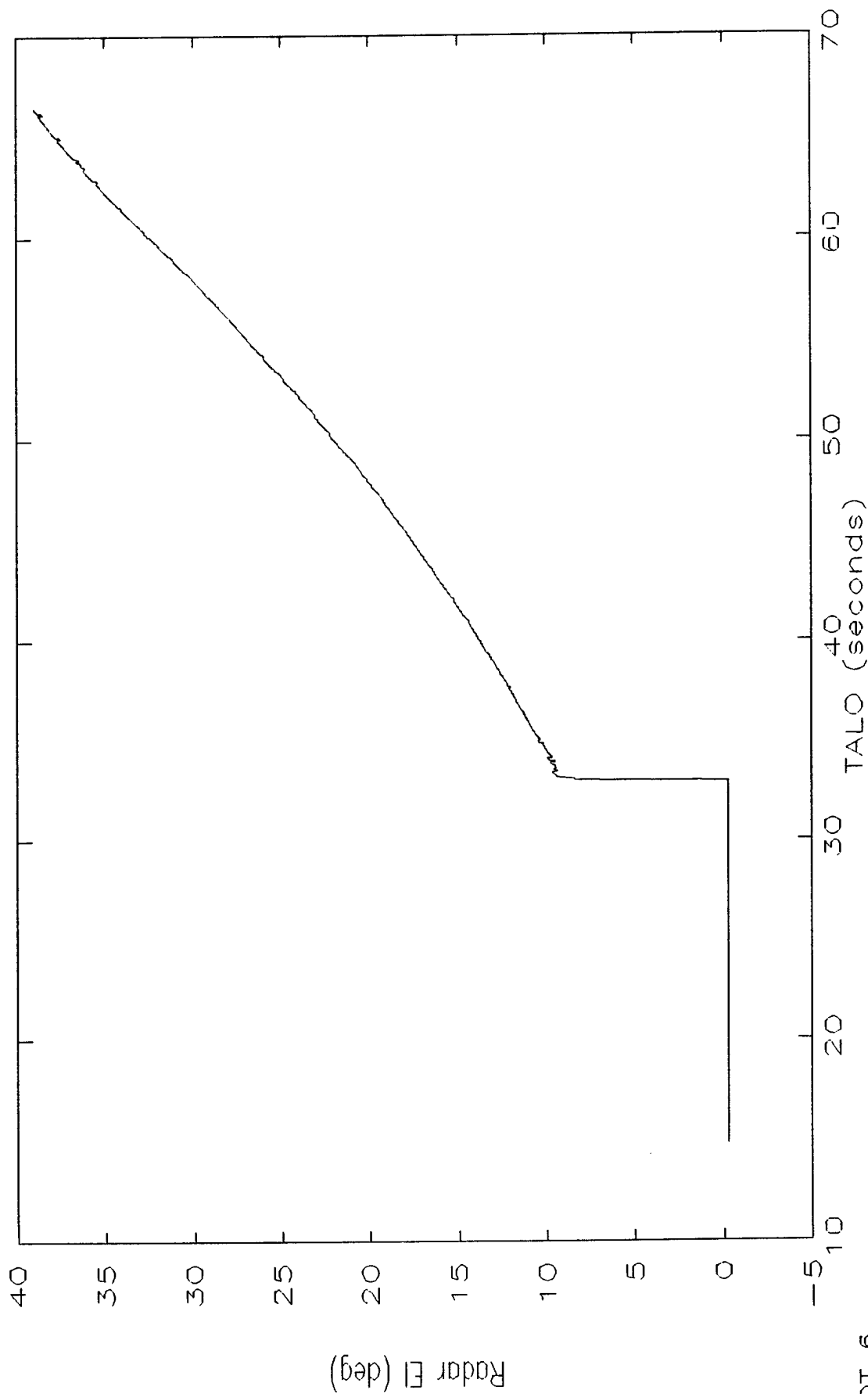
00:000:00:00:00.000, NPTS: 4993

Min:-0.2568

Max: 39.02

Mean: 14.43

Time hist. SD: 13.26



PLOT 6

VISAGE V6.14 3-DEC-91

TALO (seconds)

DILLOW.TALO MNTRADEL.USR;1

FOR OFFICIAL USE ONLY

FOR OFFICIAL USE ONLY

91287 01 == Signal ID: MNTRDASDZ

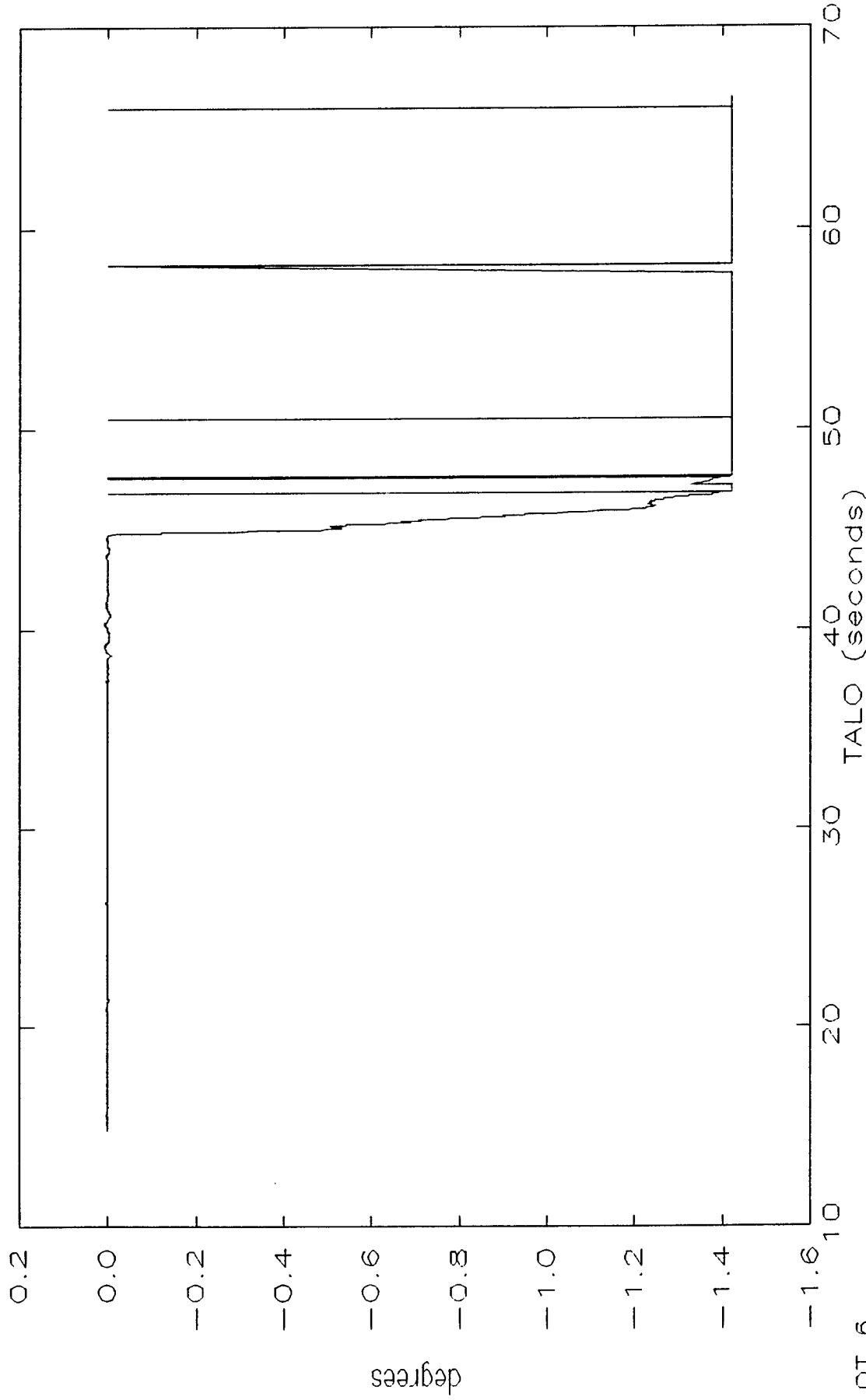
RDAS daz (degrees)

00:00:00:00:00:00.000, NPTS: 4993

Time hist. SD: 0.1201E+05

Min: -1.420

Max: 0.8361E-02 Mean: -0.5665



PLOT 6

VISAGE V6.14 4-DEC-91

DILLOW.TALO MNTRDASDZ.USR;1

FOR OFFICIAL USE ONLY

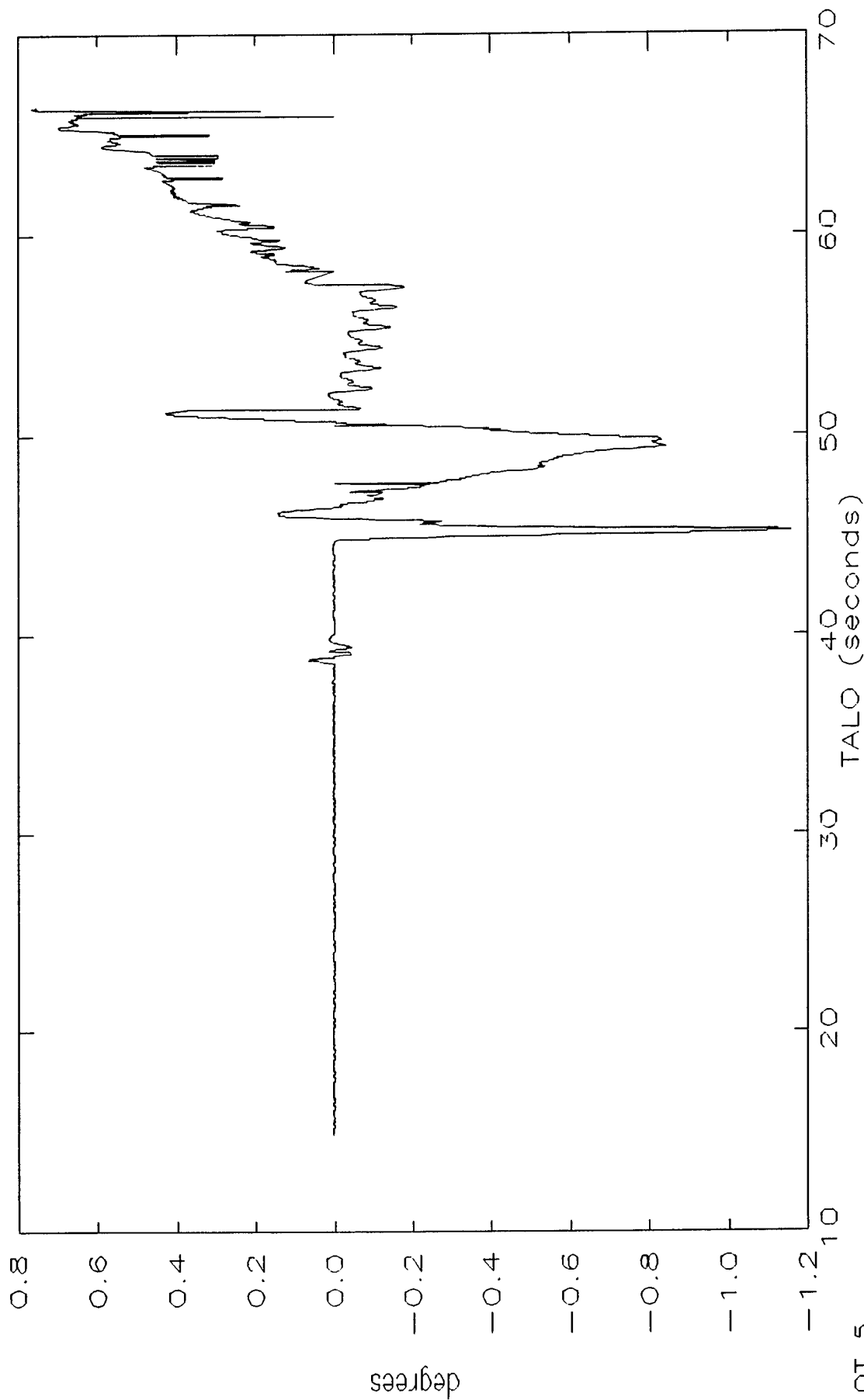
FOR OFFICIAL USE ONLY

91287 01 == Signal ID: MNTRDASDEL

RDAS del (degrees)

00:000:00:00:00.000, NPTS: 4993

Min: -1.156 Max: 0.7666 Mean: 0.1851E-01 Time hist. SD: 4230.



PLOT 5

VISAGE V6.14 4-DEC-91

DILLOW.TALO MNTRDASDEL.USR;1

FOR OFFICIAL USE ONLY

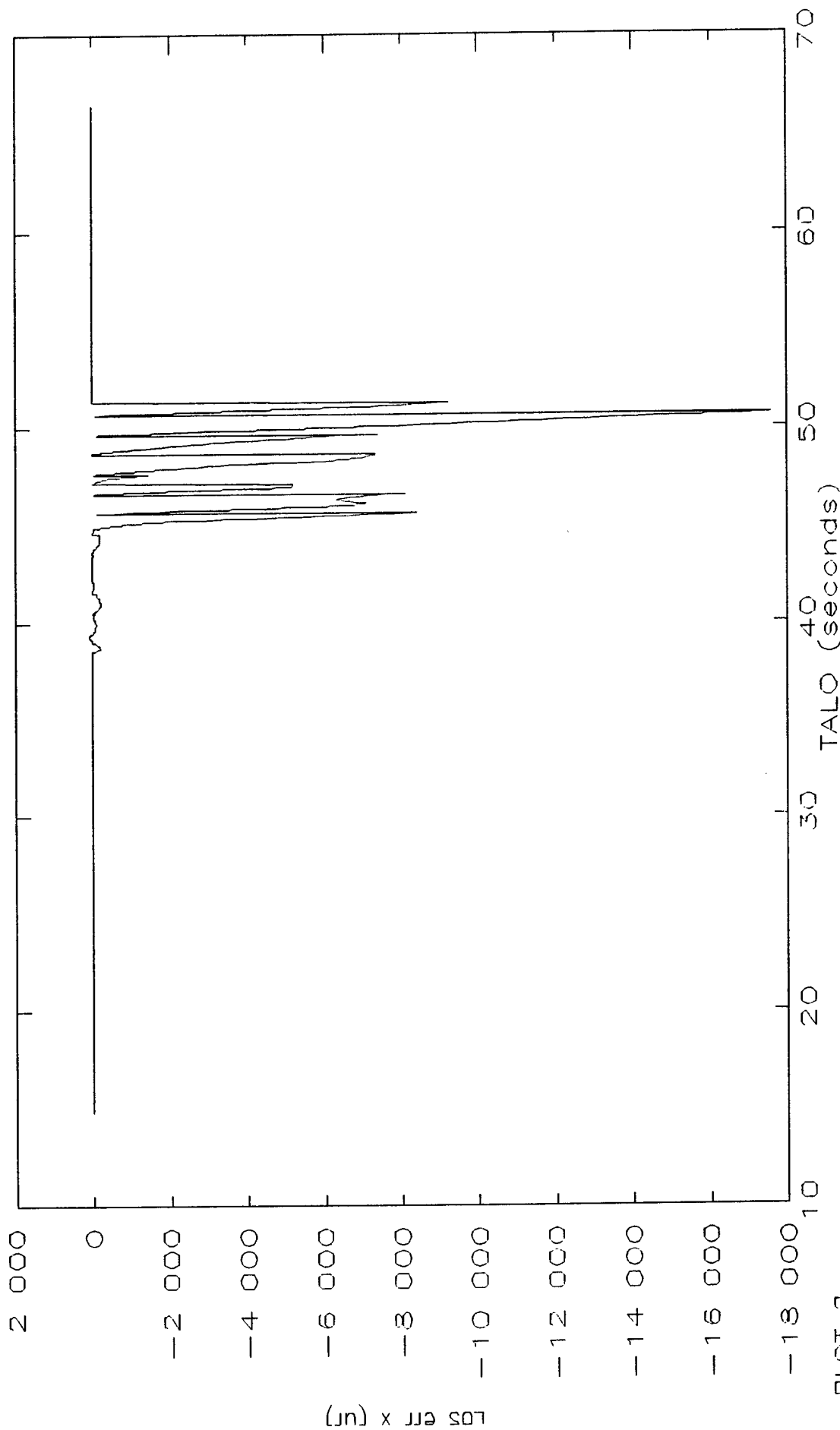
FOR OFFICIAL USE ONLY

91287 01 == Signal ID: MNTLOSERRX

Los err x (ur)

00:00:00:00:00.000, NPTS: 4993

Min: -0.1758E+05 Max: 79.00 Mean: -563.8 Time hist. SD: 2028.



PLOT 2

VISAGE V6.14 3-DEC-91

DILLOW.TALO MNTLOSERRX.USR;1

FOR OFFICIAL USE ONLY

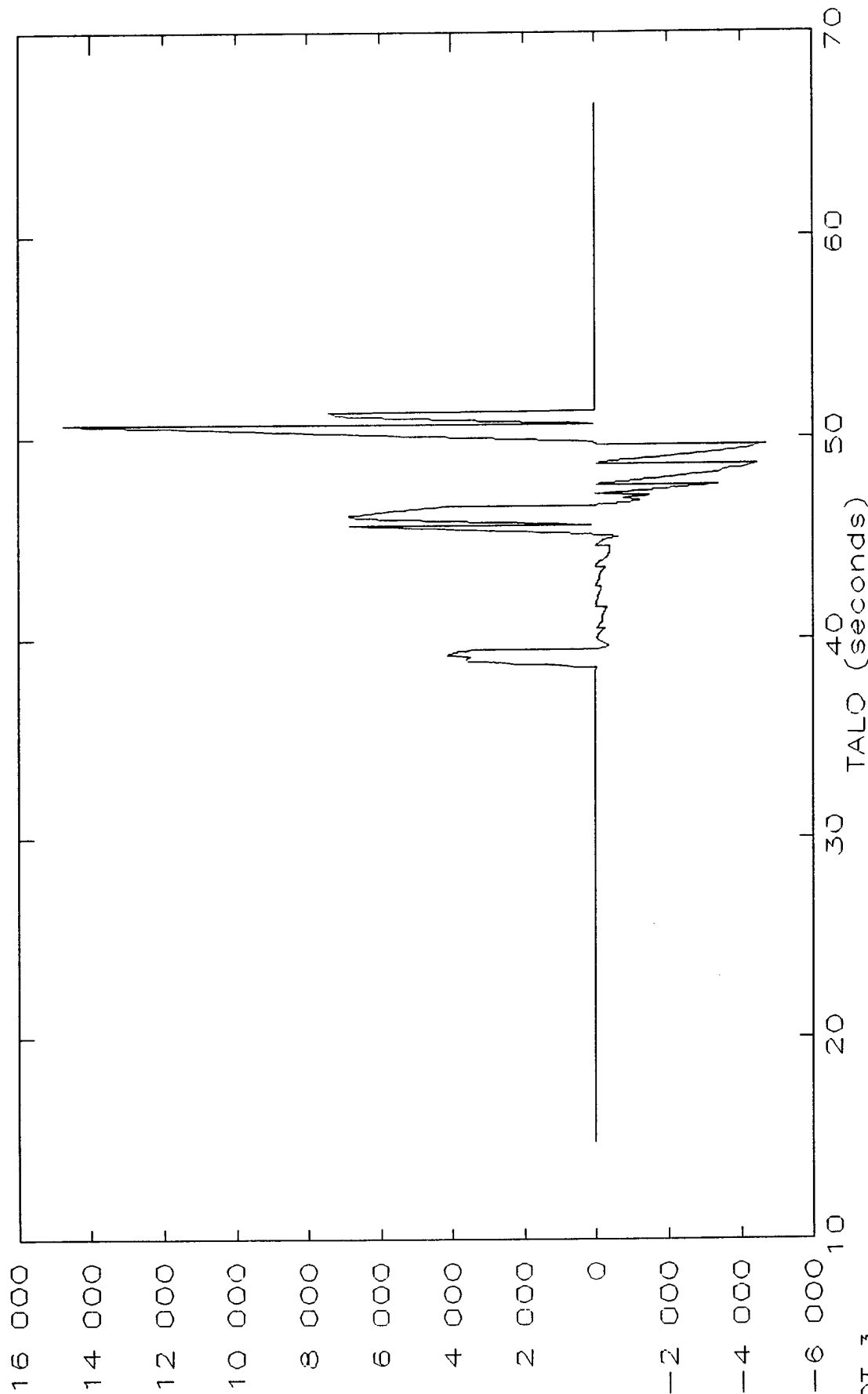
FOR OFFICIAL USE ONLY

91287 01 == Signal ID: MNTLOSERY

Los err y (ur)

00:000:00:00:00.000, NPTS: 4993

Min: -4712. Max: 0.1476E+05 Mean: 256.2 Time hist. SD: 1714.



PLOT 3

VISAGE V6.14 3-DEC-91

DILLOW.TALO MNTLOSERY.USR;1

FOR OFFICIAL USE ONLY

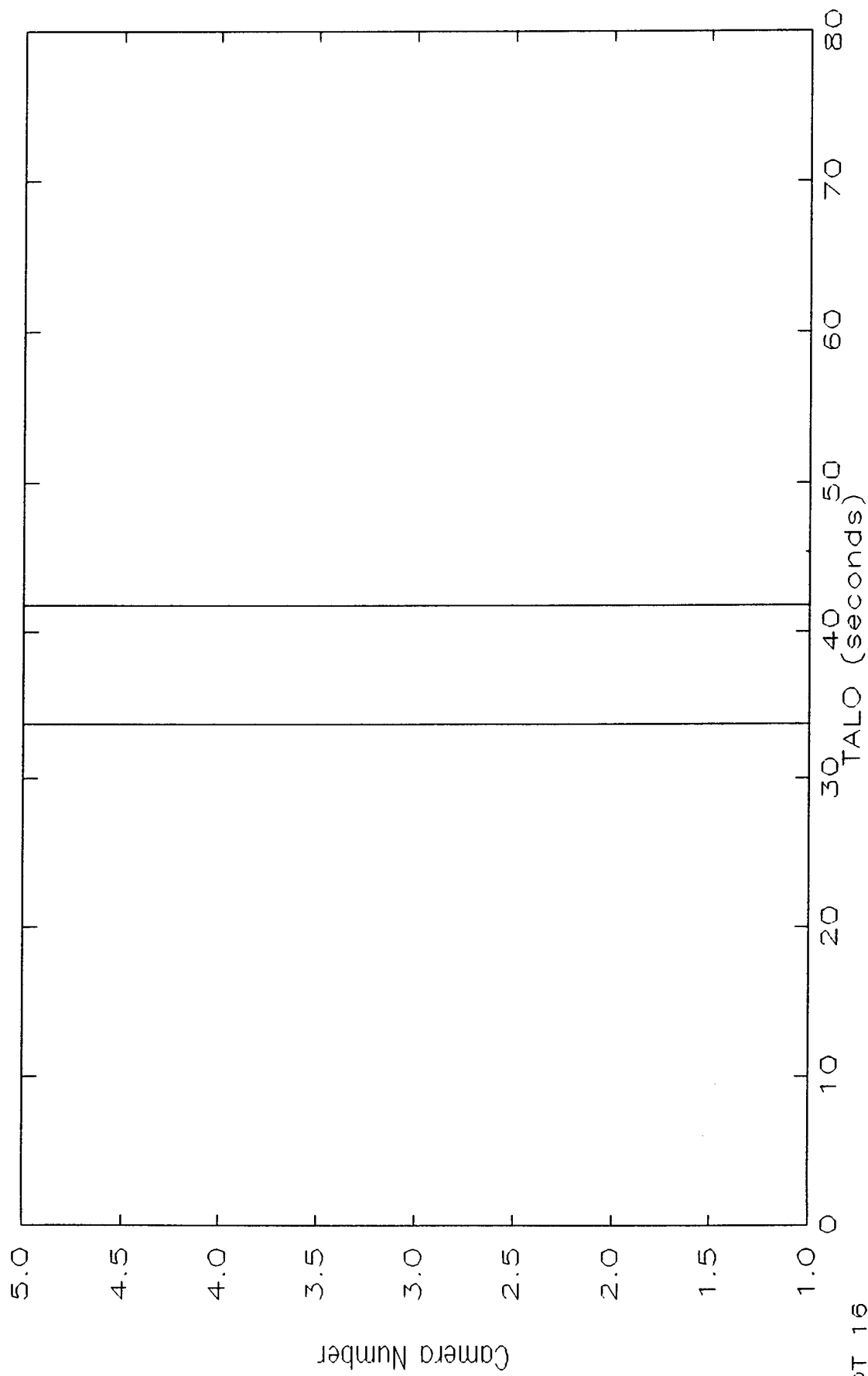
FOR OFFICIAL USE ONLY

91287 01 == Signal ID: AMTSENSOR1

AMT Track Sensor

91:287:10:17:00.000, NPTS: 3862

Min: 1.000 Max: 5.000 Mean: 1.390 Time hist. SD: 1.187



PLOT 16

VISAGE V6.14 25-OCT-91

DILLOW AMTSENSOR1.USR;1

FOR OFFICIAL USE ONLY

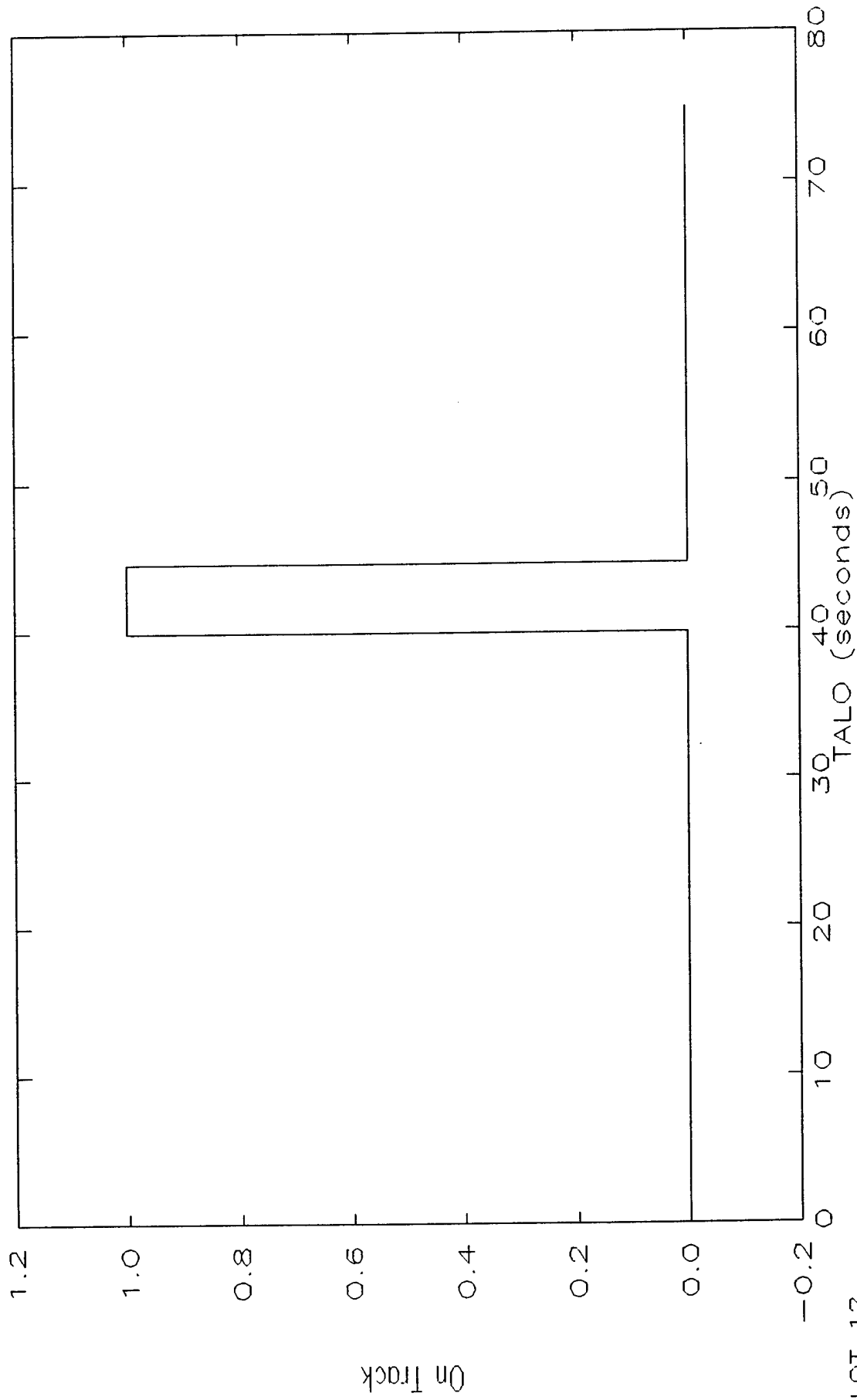
FOR OFFICIAL USE ONLY

91287 01 == Signal ID: AMTONTRACK

AMT On-Track Indicator

91:287:10:17:00.000, NPTS: 3862

Min: 0.0000E+00 Max: 1.000 Mean: 0.5179E-01 Time hist. SD: 0.2216



PLOT 12

VISAGE V6.14 25-OCT-91

DILLOW AMTONTRACK.USR;1

FOR OFFICIAL USE ONLY

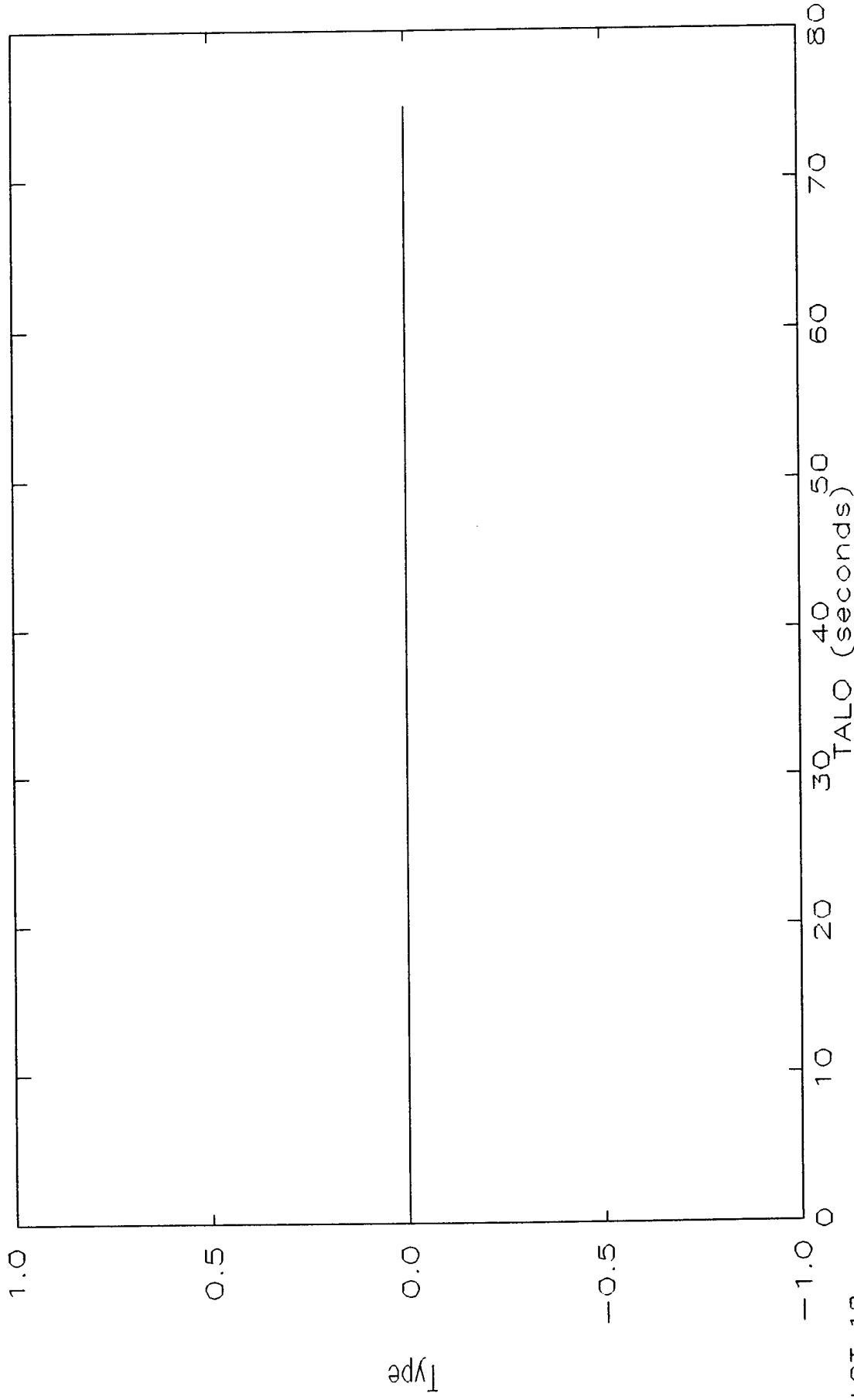
FOR OFFICIAL USE ONLY

91287 01 == Signal ID: AMTTRKTYPE

AMT Type of Track

91:287:10:17:00.000, NPTS: 3862

Min: 0.00000E+00 Max: 0.00000E+00 Mean: 0.00000E+00 Time hist. SD: 0.00000E+00



PLOT 18

VISAGE V6.14 25-OCT-91

DILLOW AMTTRKTYPE.USR;1

FOR OFFICIAL USE ONLY



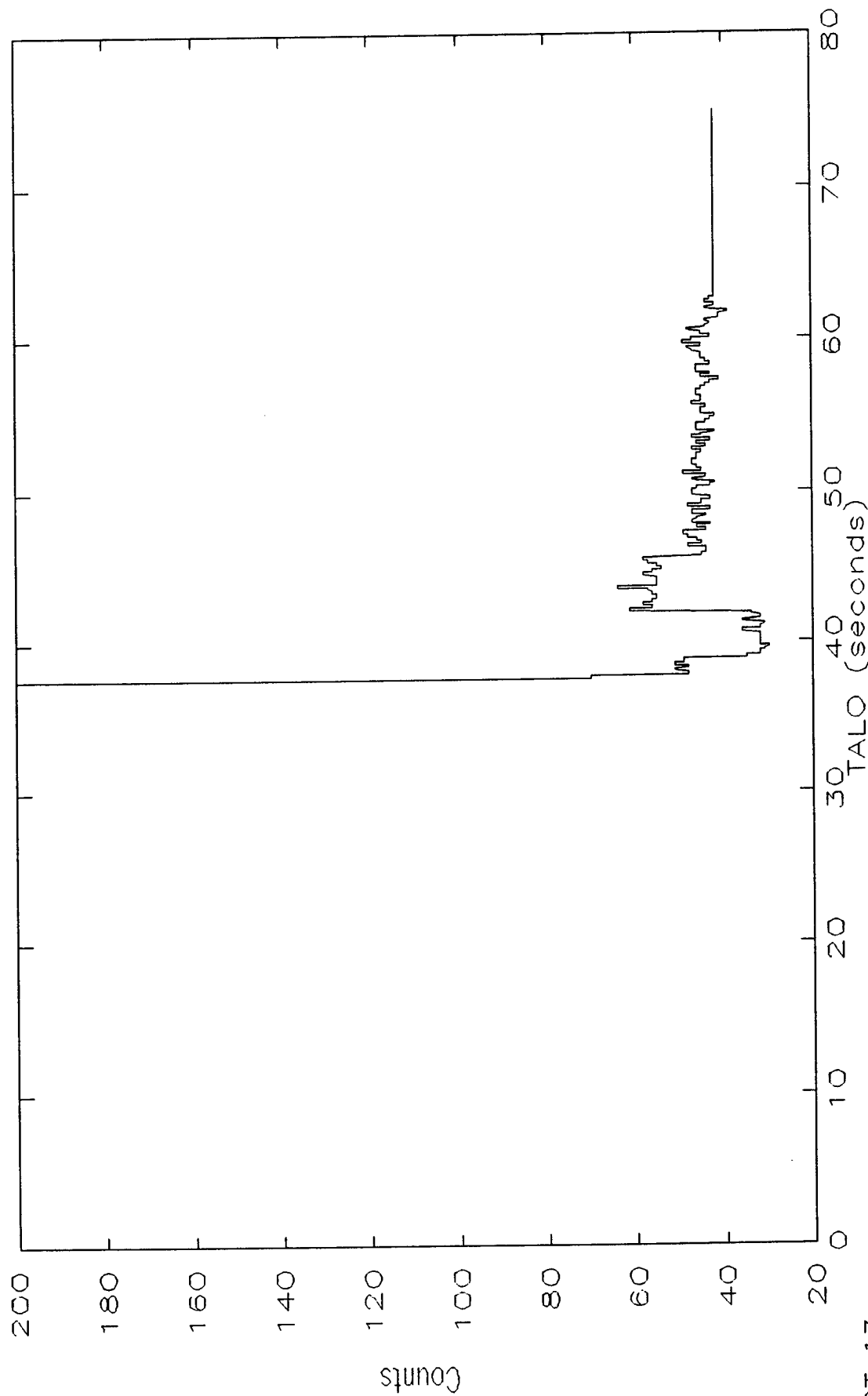
FOR OFFICIAL USE ONLY

91287 01 == Signal ID: AMTTTHRESH

AMT Track Threshold

91:287:10:17:00.000, NPTS: 3862

Min: 30.00 Max: 200.0 Mean: 124.3 Time hist. SD: 77.89



PLOT 17

VISAGE V6.14 25-OCT-91

DILLON AMTTTHRESH.USR;1

FOR OFFICIAL USE ONLY

FOR OFFICIAL USE ONLY

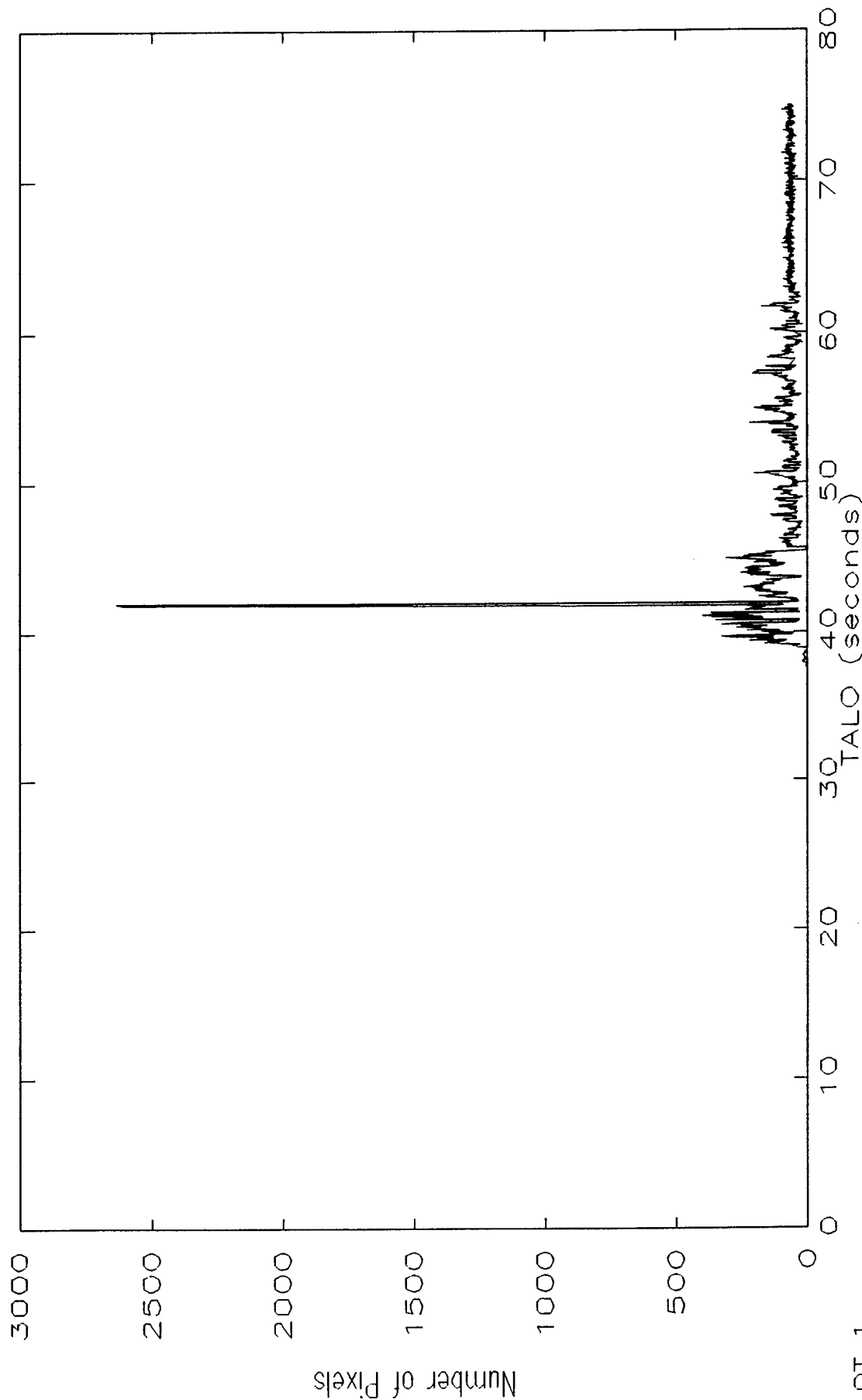
91287 01 == Signal ID: AMTCOUNT

AMT Pixels Above Threshold

91:287:10:17:00.000, NPTS: 3862

Min: 0.00000E+00 Max: 2637.

Mean: 41.22 Time hist. SD: 97.37



PLOT 1

VISAGE V6.14 25-OCT-91

DILLOW AMTCOUNT.USR;1

FOR OFFICIAL USE ONLY

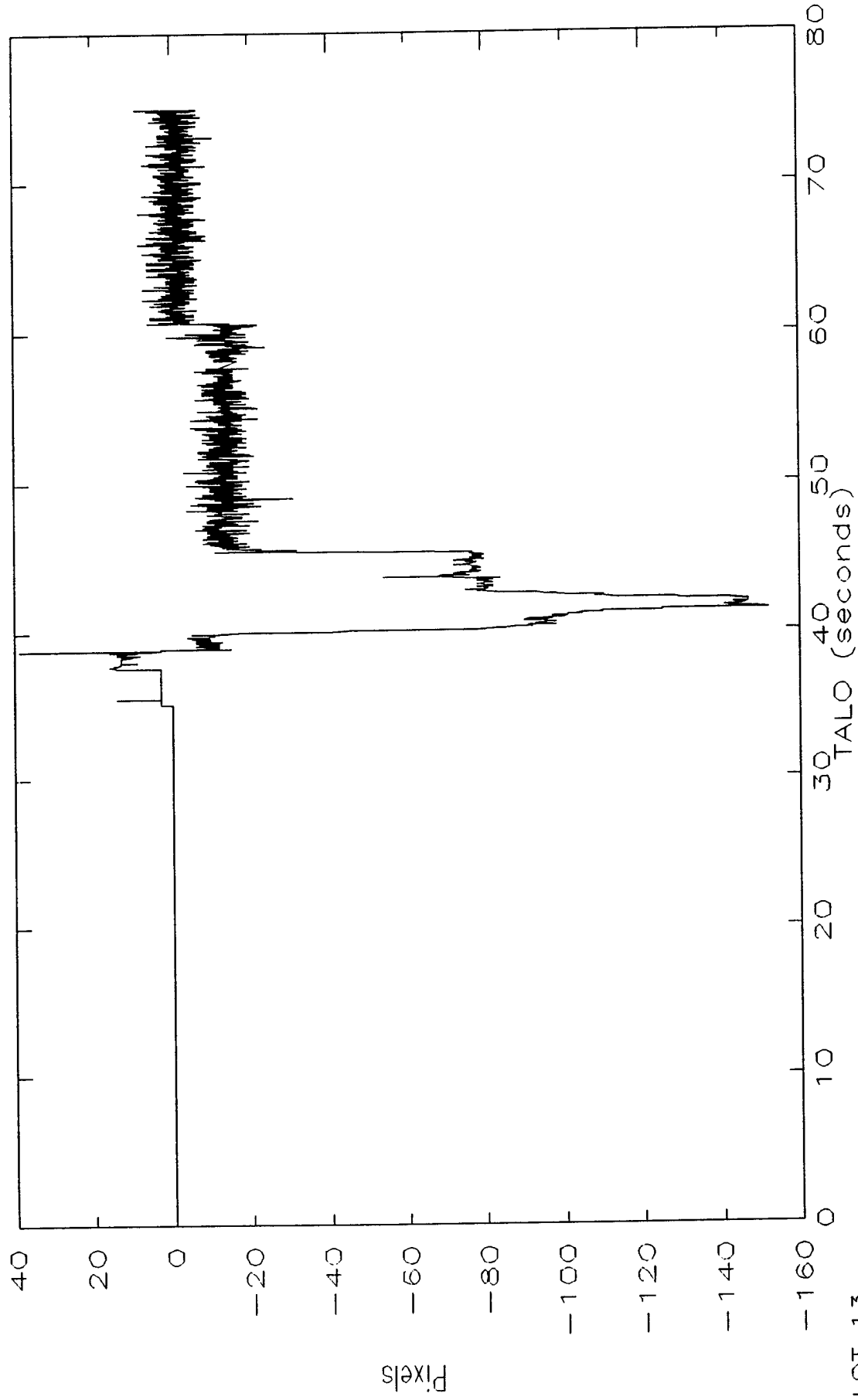
FOR OFFICIAL USE ONLY

91287 01 == Signal ID: AMTSCRERRX

AMT Track X Error

91:287:10:17:00.000, NPTS: 3862

Min: -152.0 Max: 39.00 Mean: -8.475 Time hist. SD: 23.12



PLOT 13

VISAGE V6.14 25-OCT-91

DILLOW AMTSCRERRX:USR;1

FOR OFFICIAL USE ONLY

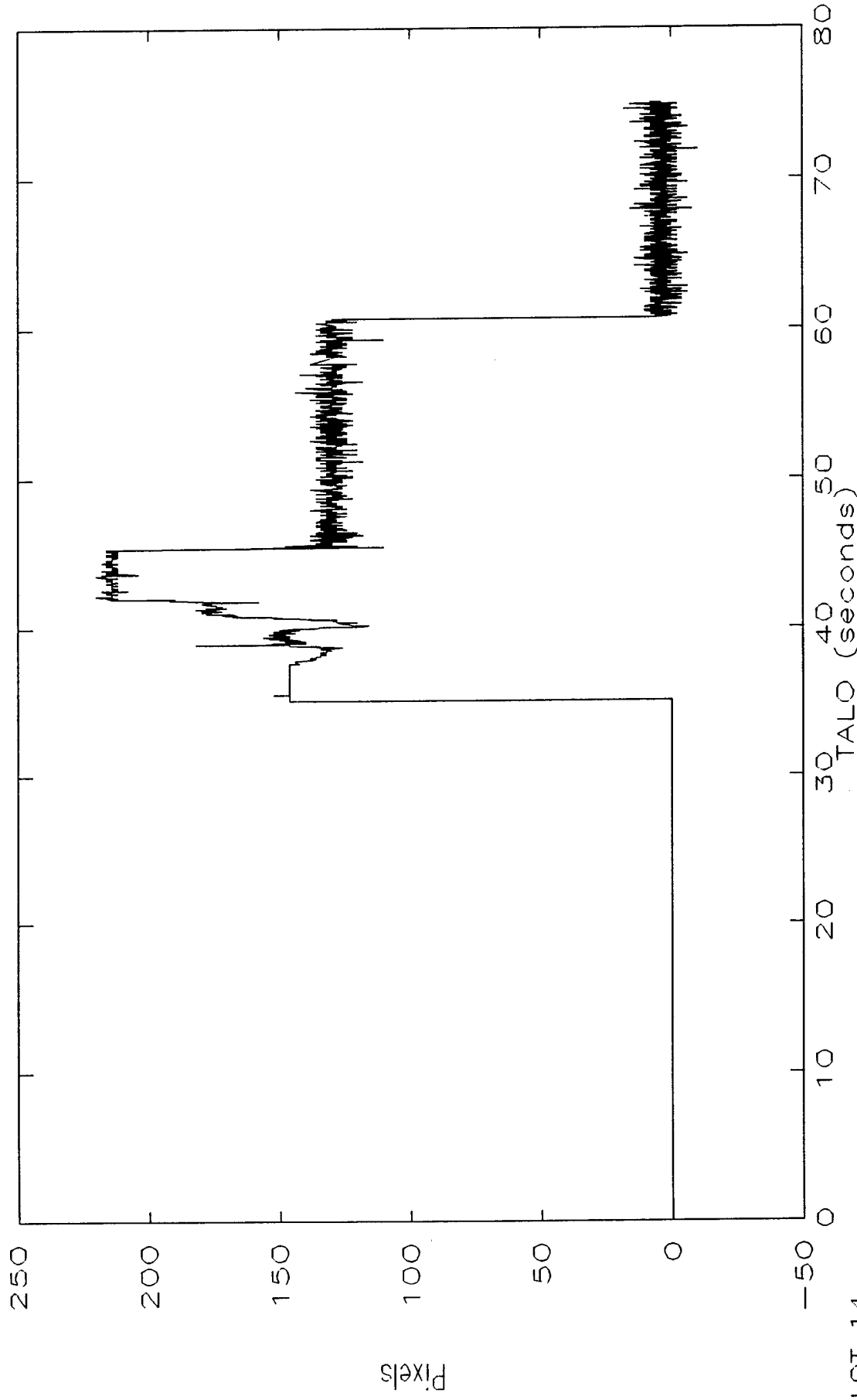
FOR OFFICIAL USE ONLY

91287 01 == Signal ID: AMTSCRERY

AMT Track Y Error

91:287:10:17:00.000, NPTS: 3862

Min: -10.00 Max: 220.0 Mean: 47.52 Time hist. SD: 69.39



PLOT 14

VISAGE V6.14 25-OCT-91

DILLOW AMTSCRERYUSR;1

FOR OFFICIAL USE ONLY

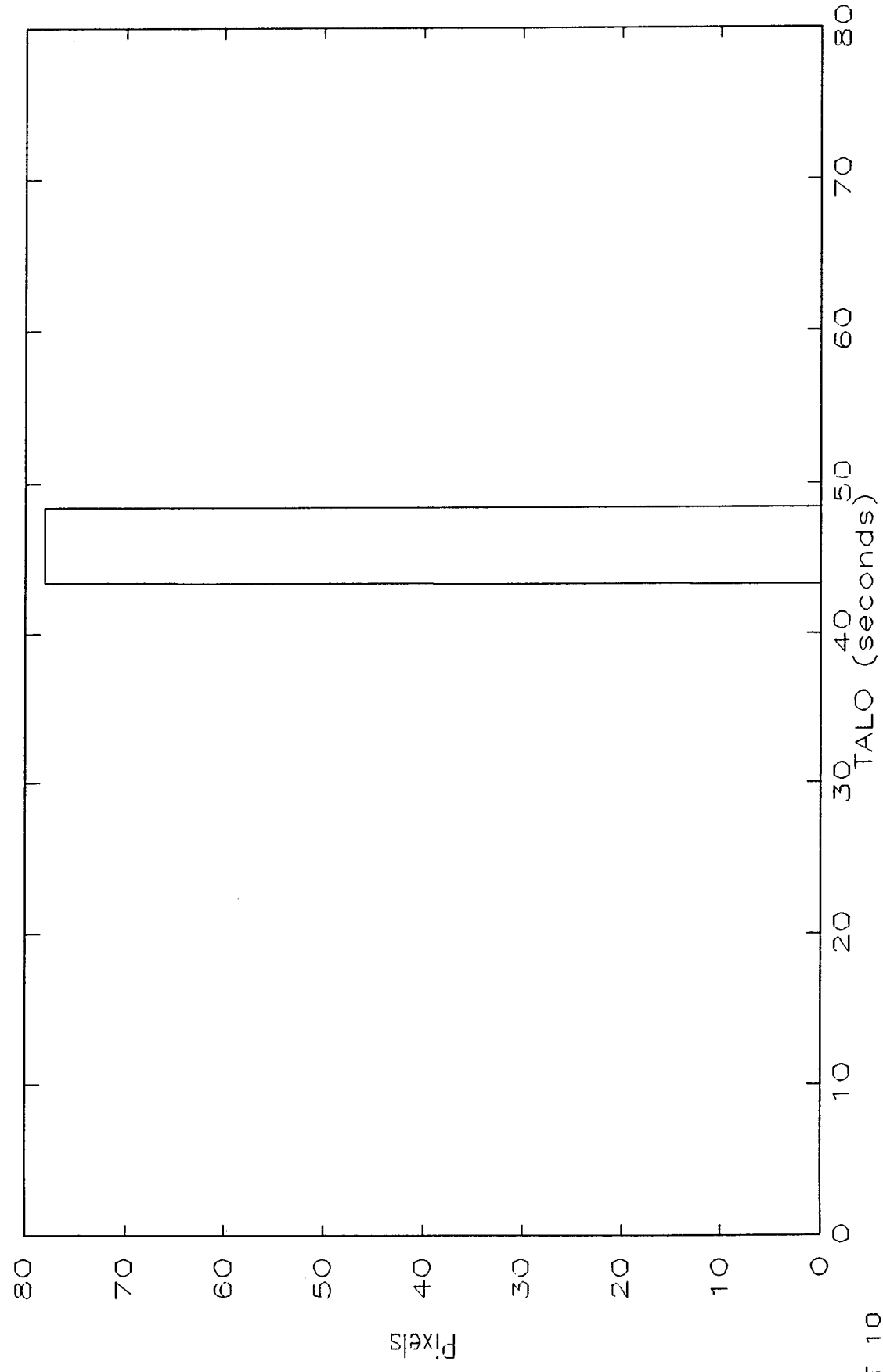
FOR OFFICIAL USE ONLY

91287 01 == Signal ID: AMTOFFSETX

AMT Track X Offset

91:287:10:17:00.000, NPTS: 3862

Min: 0.0000E+00 Max: 78.00 Mean: 5.049 Time hist. SD: 19.19



PLOT 10

VISAGE V6.14 25-OCT-91

DILLOW AMTOFFSETX.USR;1

FOR OFFICIAL USE ONLY

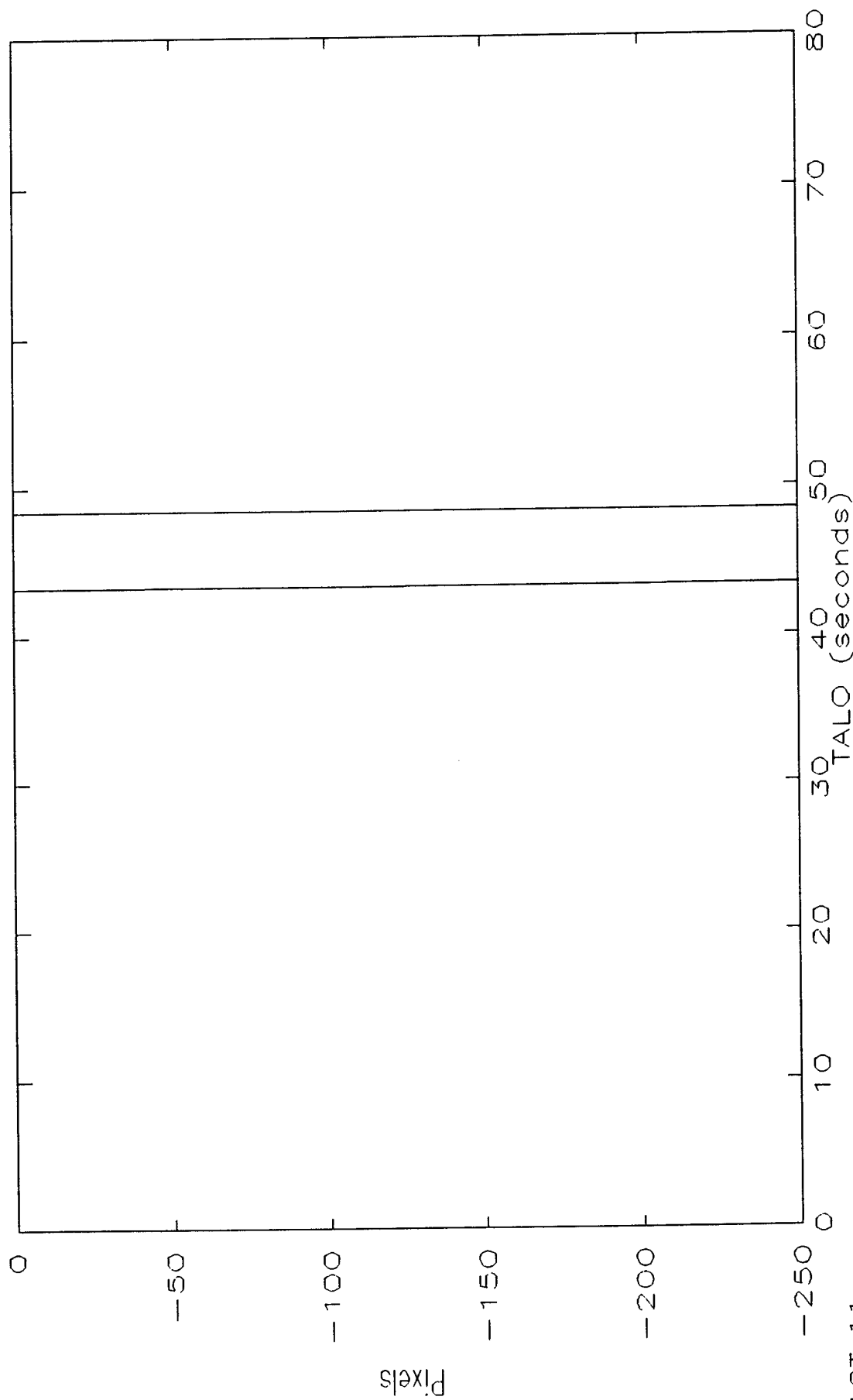
FOR OFFICIAL USE ONLY

91287 01 == Signal ID: AMTOFFSET

AMT Track Y Offset

91:287:10:17:00.000, NPTS: 3862

Min: -250.0 Max: 0.0000E+00 Mean: -16.18 Time hist. SD: 61.51



PLOT 11

VISAGE V6.14 25-OCT-91

DILLOW AMTOFFSET.USR;1

FOR OFFICIAL USE ONLY

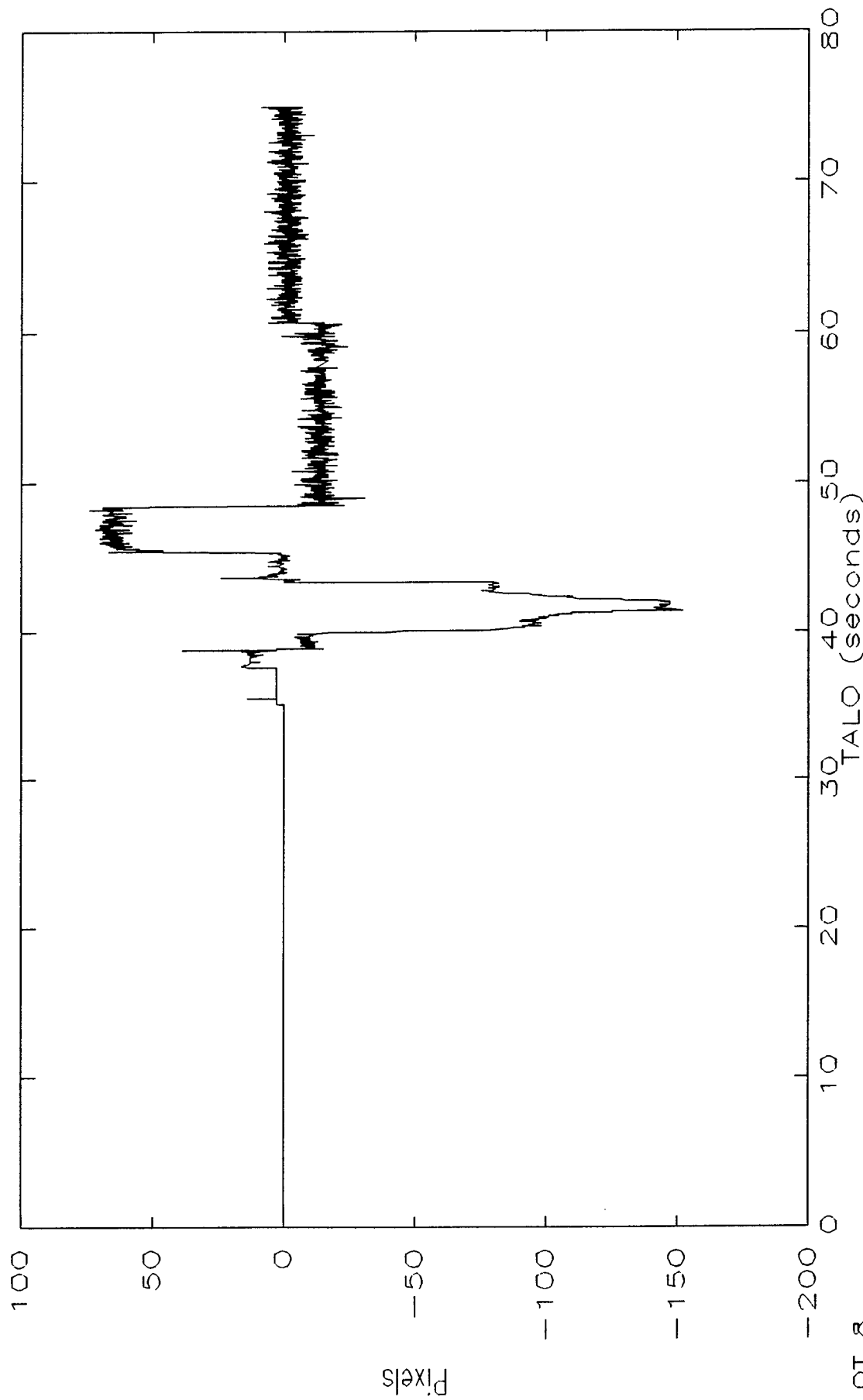
FOR OFFICIAL USE ONLY

91287 01 == Signal ID: AMTOFFERRX

AMT Track X Offset Error

91:287:10:17:00.000, NPTS: 3862

Min: -152.0 Max: 74.00 Mean: -3.426 Time hist. SD: 24.37



VISAGE V6.14 25-OCT-91

DILLOW AMTOFFERRX.USR;1

FOR OFFICIAL USE ONLY

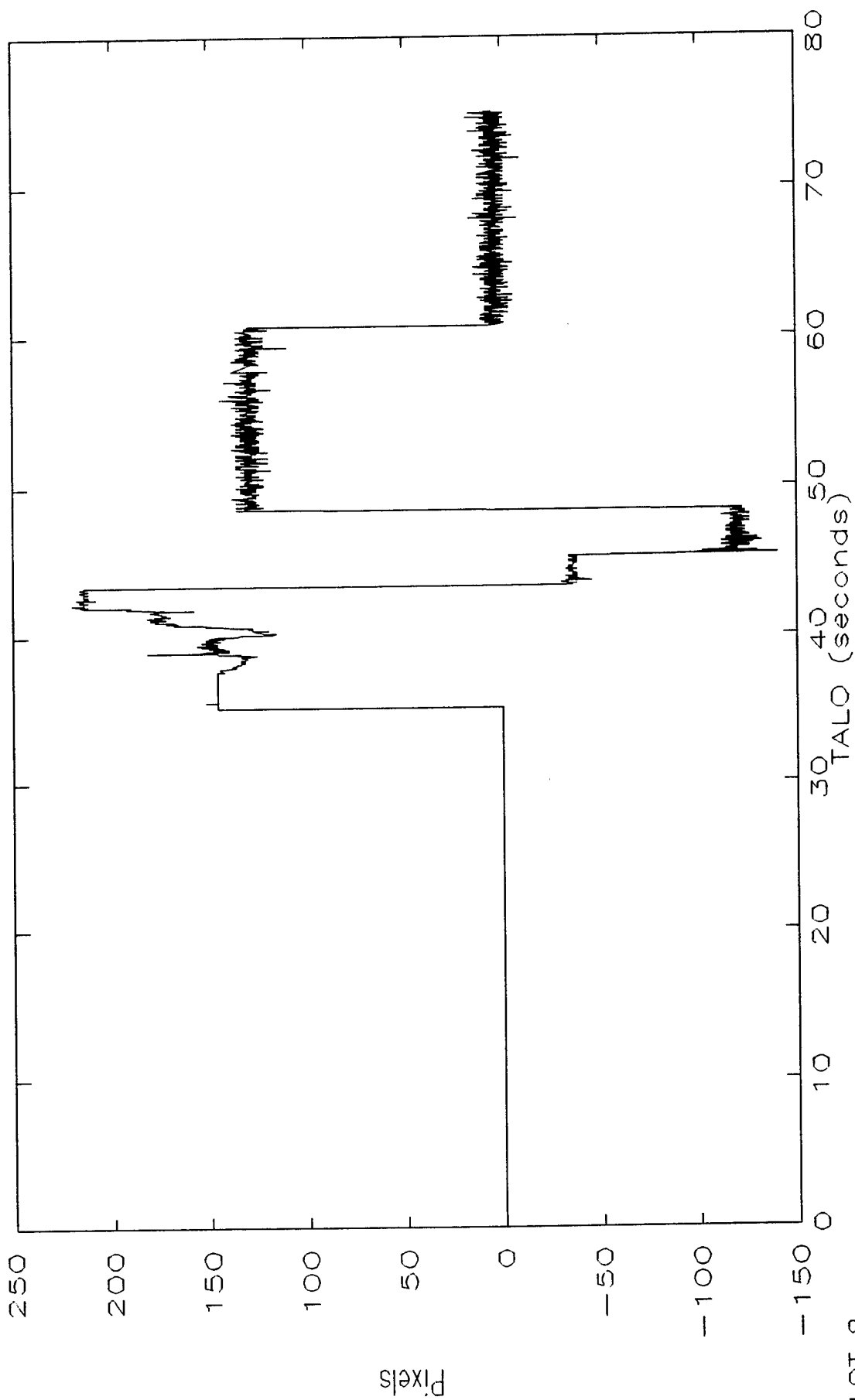
FOR OFFICIAL USE ONLY

91287 01 == Signal ID: AMTOFFERRY

AMT Track Y Offset Error

91:287:10:17:00.000, NPTS: 3862

Min: -140.0 Max: 220.0 Mean: 31.33 Time hist. SD: 69.45



FOR OFFICIAL USE ONLY



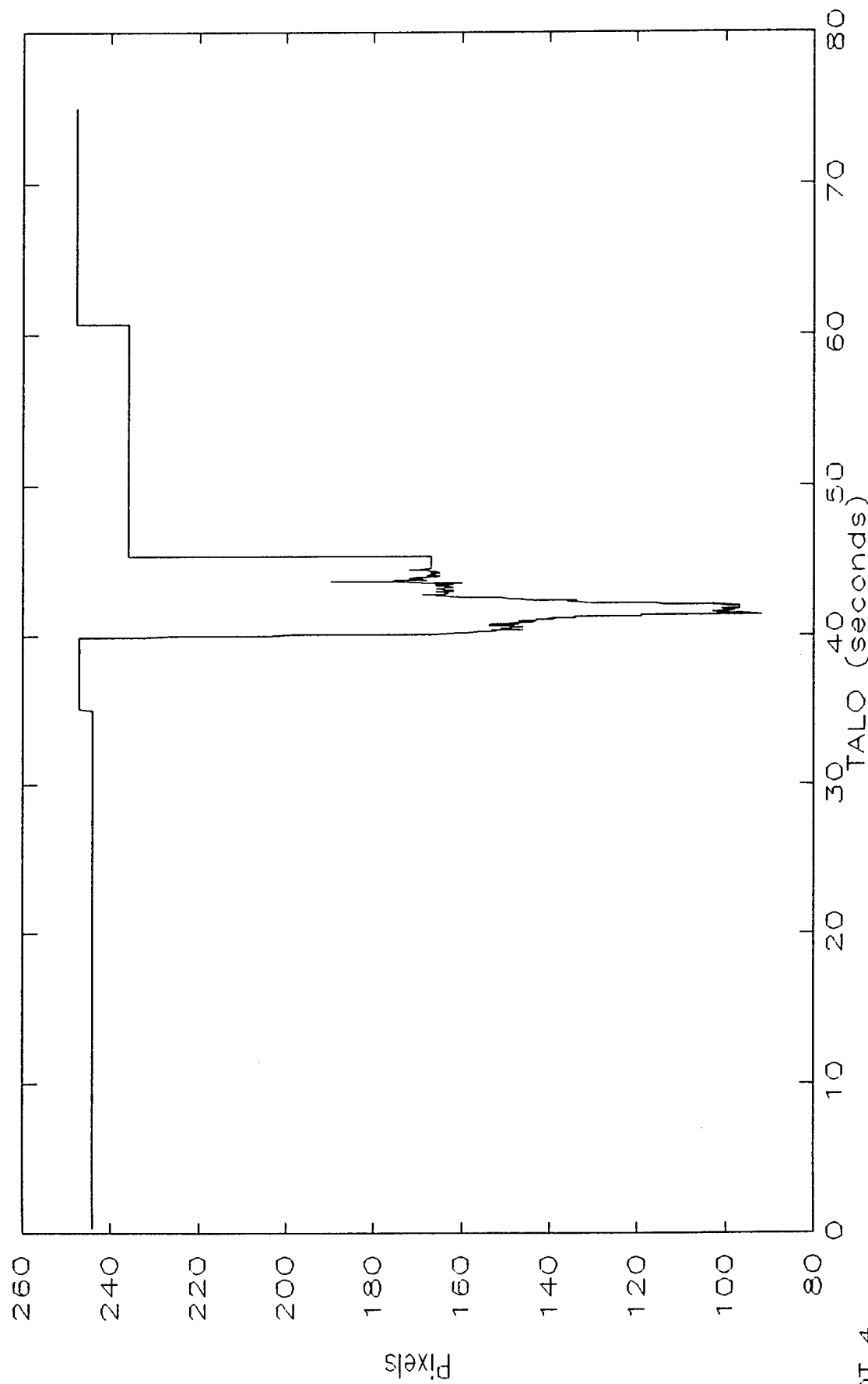
FOR OFFICIAL USE ONLY

91287 01 == Signal ID: AMTGTCENX

AMT Gate X Position

91:287:10:17:00.000, NPTS: 3862

Min: 92.00 Max: 248.0 Mean: 237.7 Time hist. SD: 23.13



VISAGE V6.14 25-OCT-91

DILLOW AMTGTCENX.USR;1

FOR OFFICIAL USE ONLY

FOR OFFICIAL USE ONLY

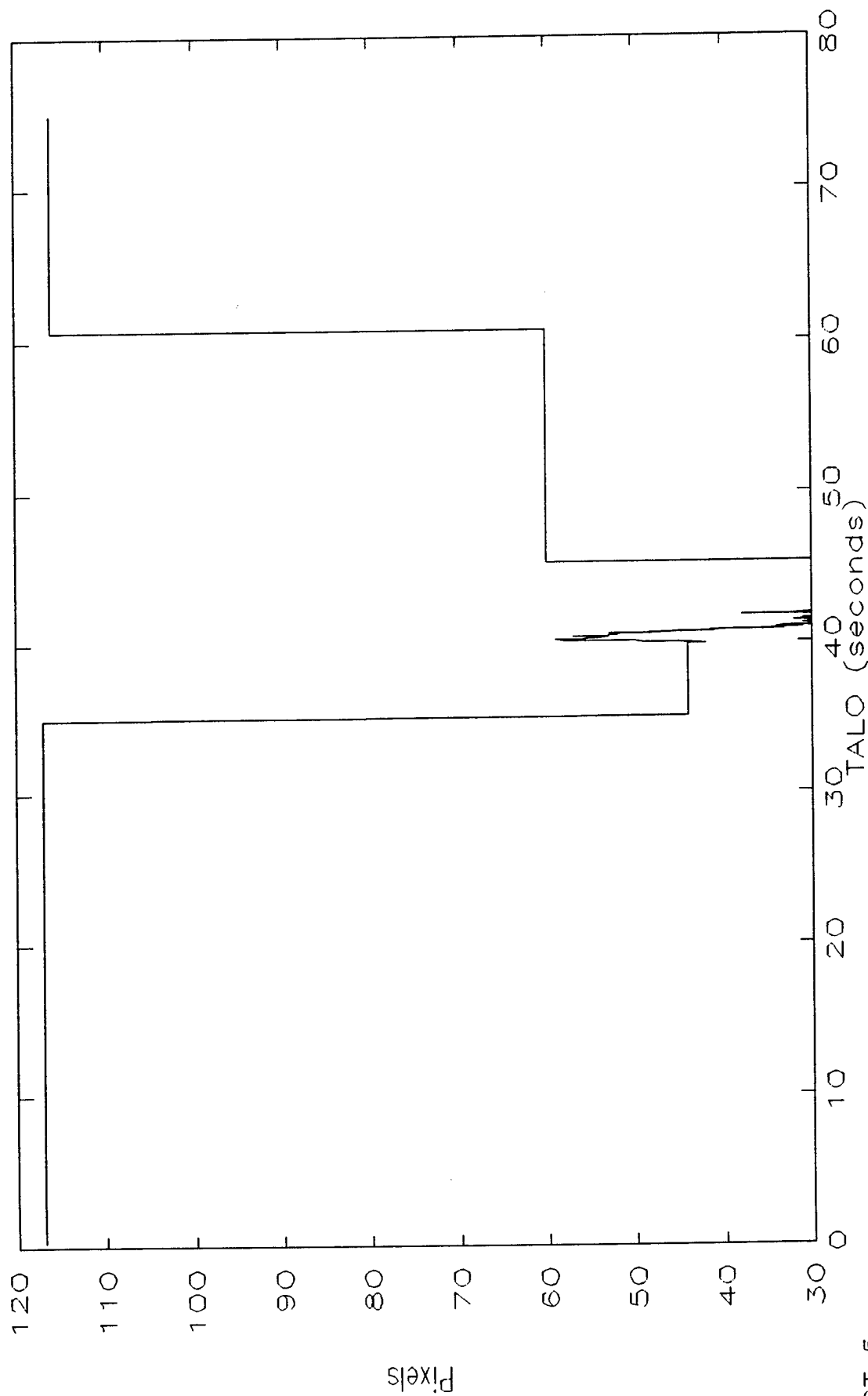
91287 01 == Signal ID: AMTGTCENY

AMT Gate Y Position

91:287:10:17:00.000, NPTS: 3862

Time hist. SD: 31.07

Min: 30.00 Max: 117.0 Mean: 95.82



PLOT 5

VISAGE V6.14 25-OCT-91

DILLOW AMTGTCENY.USR:1

FOR OFFICIAL USE ONLY

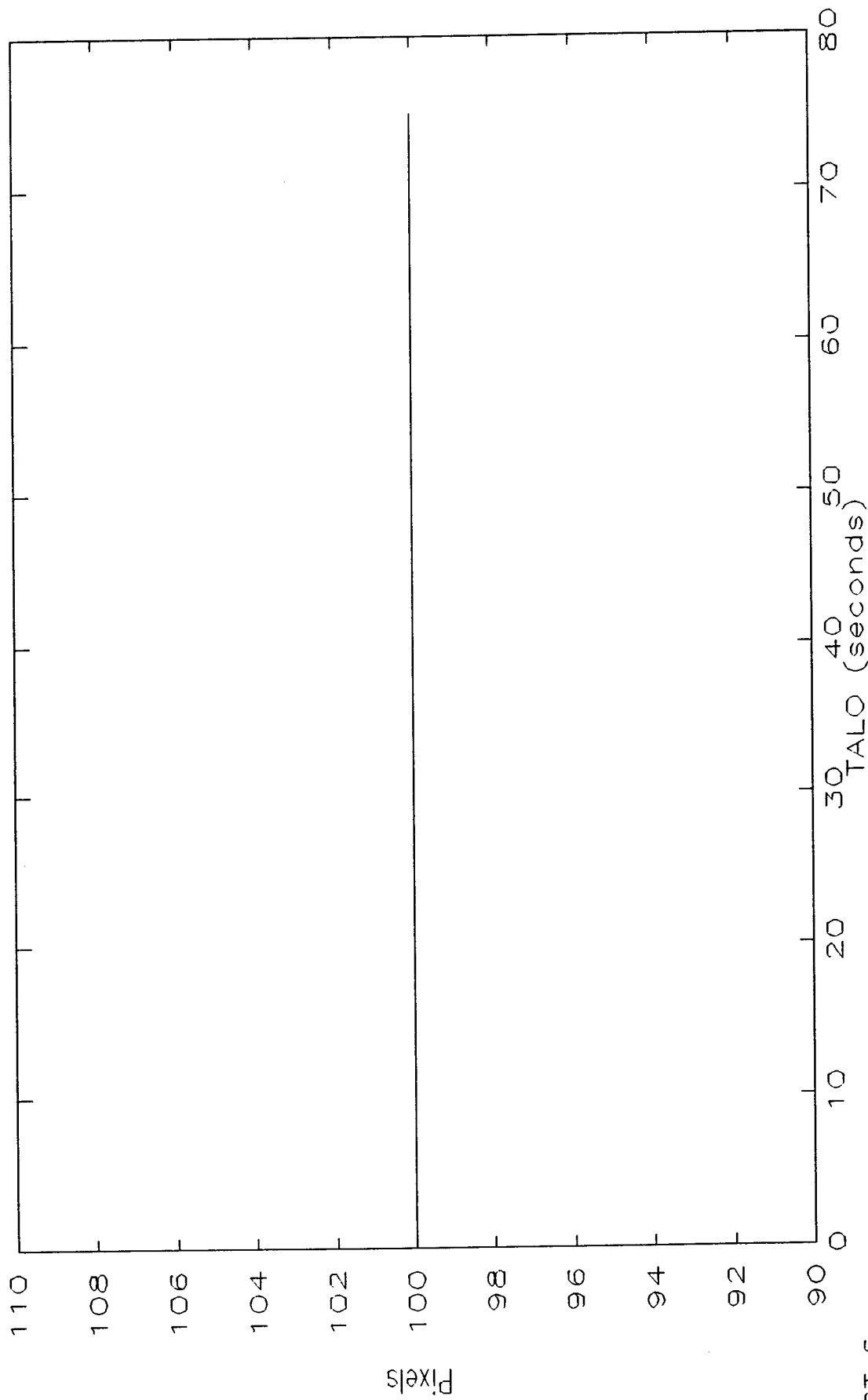
FOR OFFICIAL USE ONLY

91287 01 == Signal ID: AMTGTSIZX

AMT Gate X Size

91:287:10:17:00.000, NPTS: 3862

Min: 100.0 Max: 100.0 Mean: 100.0 Time hist. SD: 0.00000E+00



PLOT 6

VISAGE V6.14 25-OCT-91

DILLOW AMTGTSIZX.USR;1

FOR OFFICIAL USE ONLY

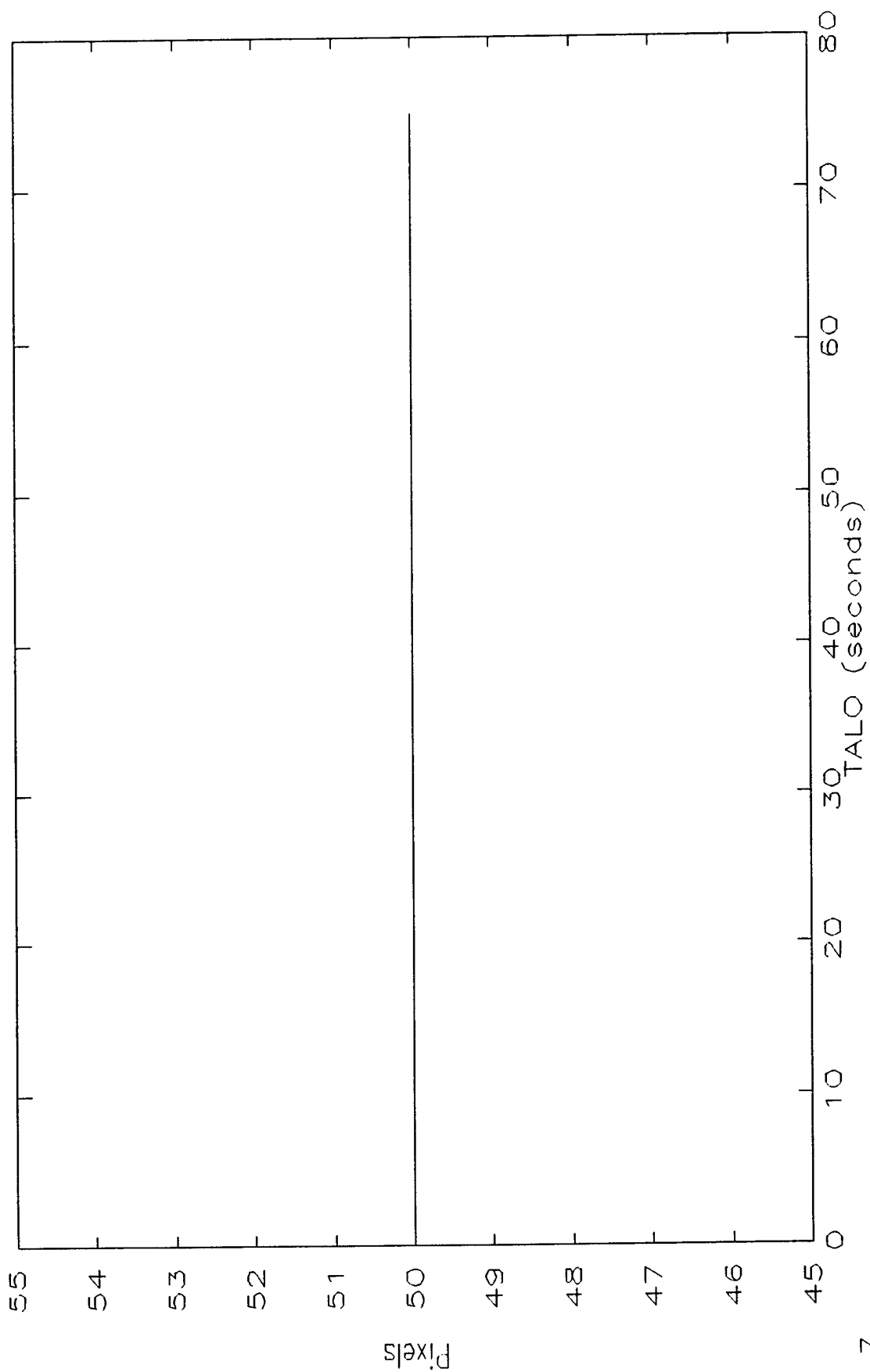
FOR OFFICIAL USE ONLY

91287 01 == Signal ID: AMTGTSIZY

AMT Gate Y Size

91:287:10:17:00.000, NPTS: 3862

Min: 50.00 Max: 50.00 Mean: 50.00 Time hist. SD: 0.00000E+00



PLOT 7

VISAGE V6.14 25--OCT--91

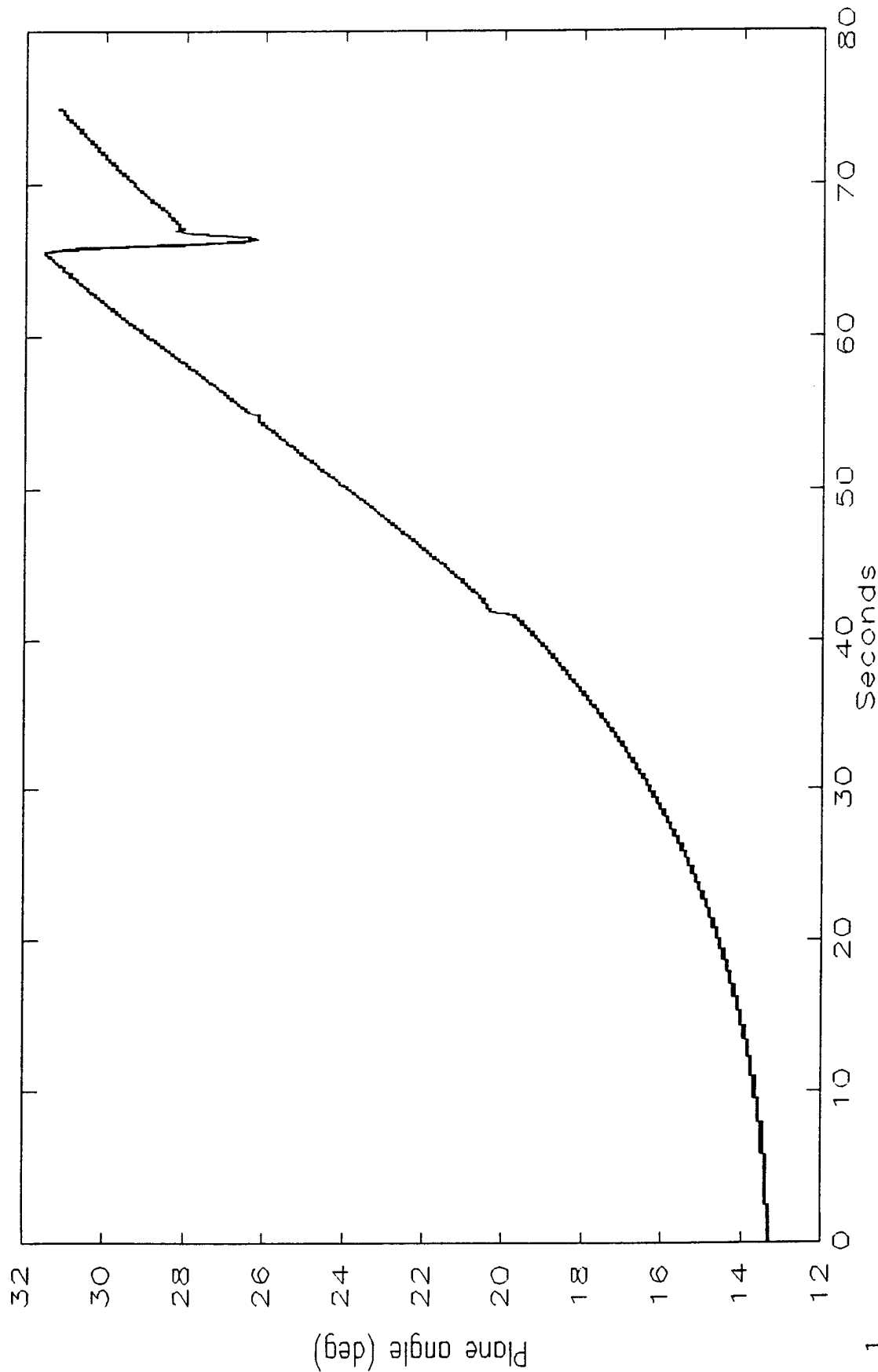
DILLOW AMTGTSIZY.USR;1

FOR OFFICIAL USE ONLY

FOR OFFICIAL USE ONLY

tfe91287 01 == Signal ID: TIMPOS AZ

91:287:10:17:23.622. NPTS: 75000. Sample Freq: 1000. samps/sec  
Min: 13.27 Max: 31.55 Mean: 20.38 SD: 6.29 RMS: 21.3



PLOT 1

VISAGE V6.14 24-OCT-91

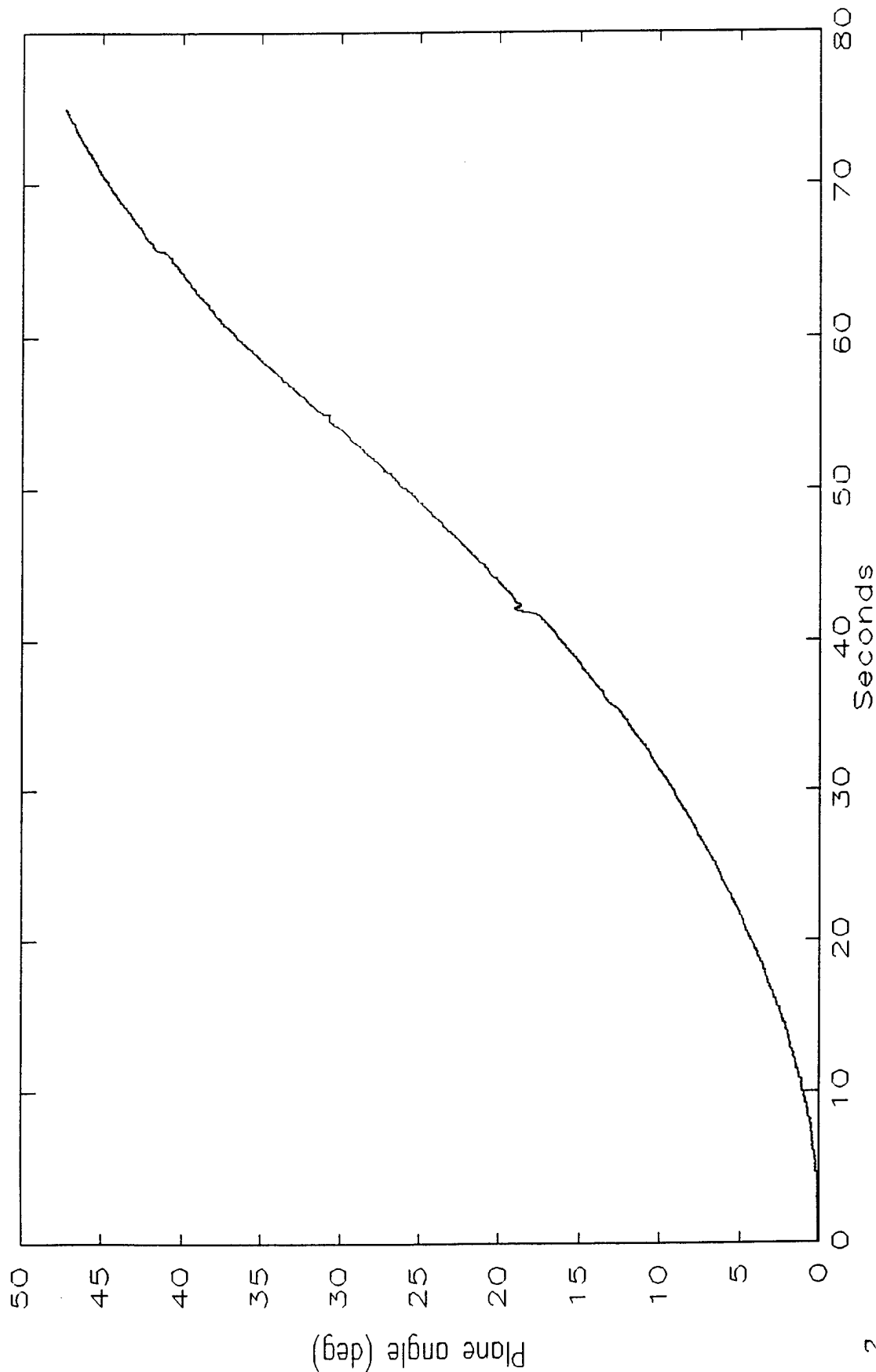
LANG.TFE TIMPOS AZ.PEU;1

FOR OFFICIAL USE ONLY

FOR OFFICIAL USE ONLY

tfe91287 01 == Signal ID: TIMPOSEL

91:287:10:17:23.622. NPTS: 75000, Sample Freq: 1000. samps/sec  
Min: 0.8789E-01 Max: 47.37 Mean: 18.38 SD: 15.6 RMS: 24.1



PLOT 2

VISAGE V6.14 24-OCT-91

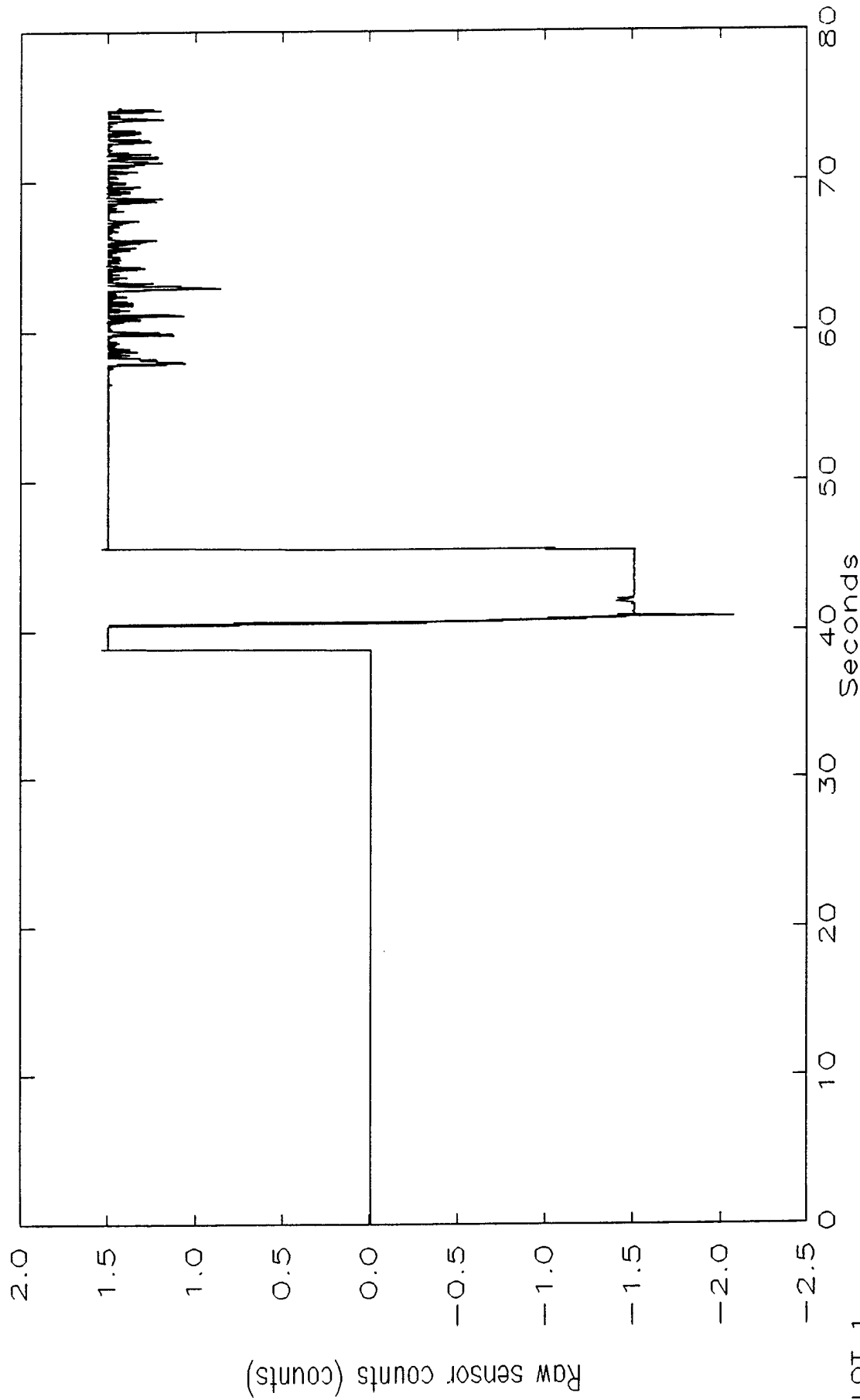
LANG.TFE TIMPOSEL.PEU;1

FOR OFFICIAL USE ONLY

FOR OFFICIAL USE ONLY

tfe91287 01 == Signal ID: AMTERRAZ

91:287:10:17:23.622, NPTS: 75000, Sample Freq: 1000, samps/sec  
Min: -2.080 Max: 1.538 Mean: 0.5133 SD: 0.882 RMS: 1.02



PLOT 1

VISAGE V6.14 24-OCT-91

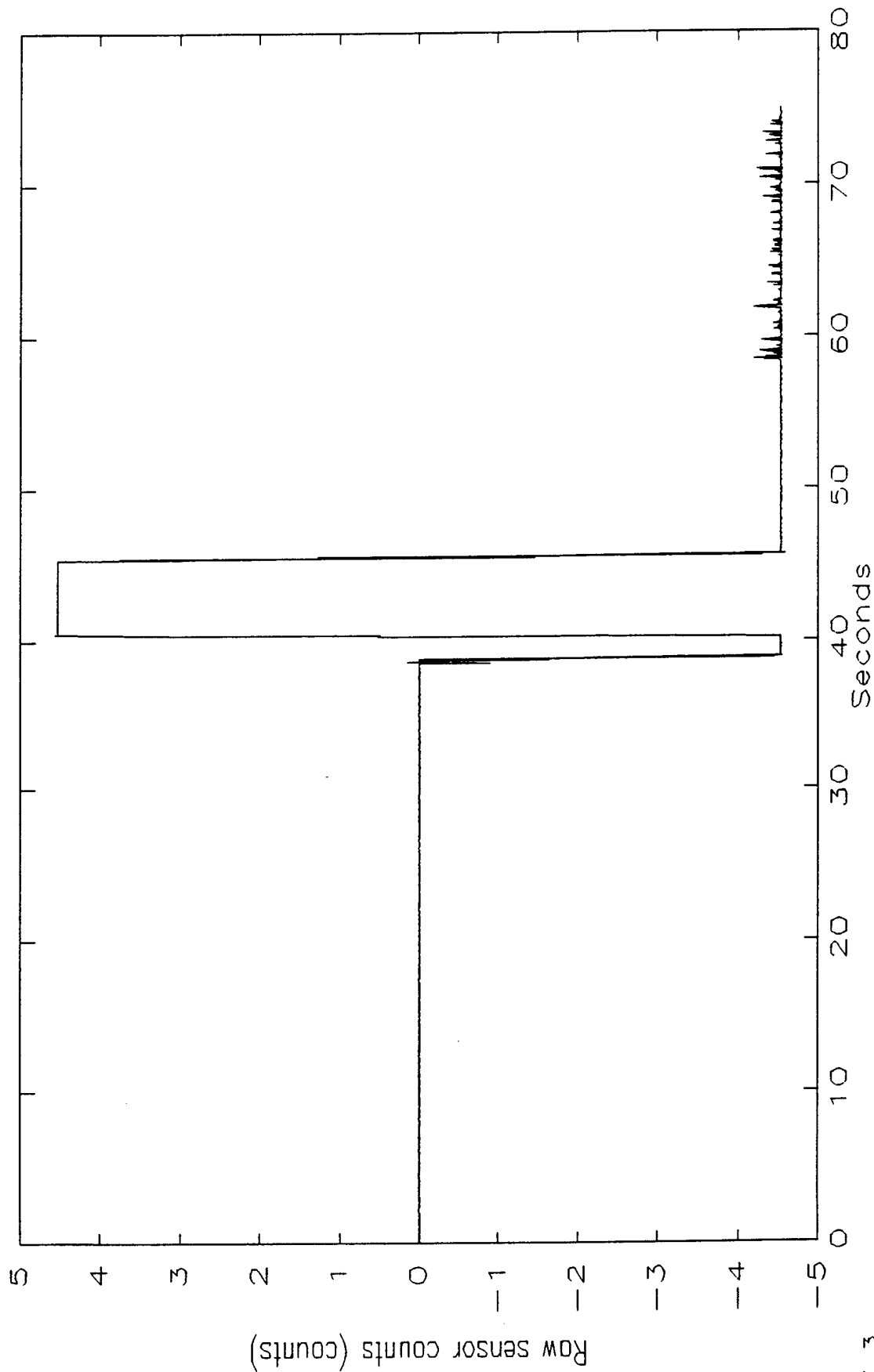
LANG.TFE AMTERRAZ.PEU;1

FOR OFFICIAL USE ONLY

FOR OFFICIAL USE ONLY

tfe91287 01 == Signal ID: AMTERREL

91:287:10:17:23.622. NPTS: 75000. Sample Freq: 1000. samps/sec  
Min: -4.590 Max: 4.565 Mean: -1.566 SD: 2.71 RMS: 3.13



PLOT 3

VISAGE V6.14 24-OCT-91

LANG.TFE AMTERREL.PEU;1

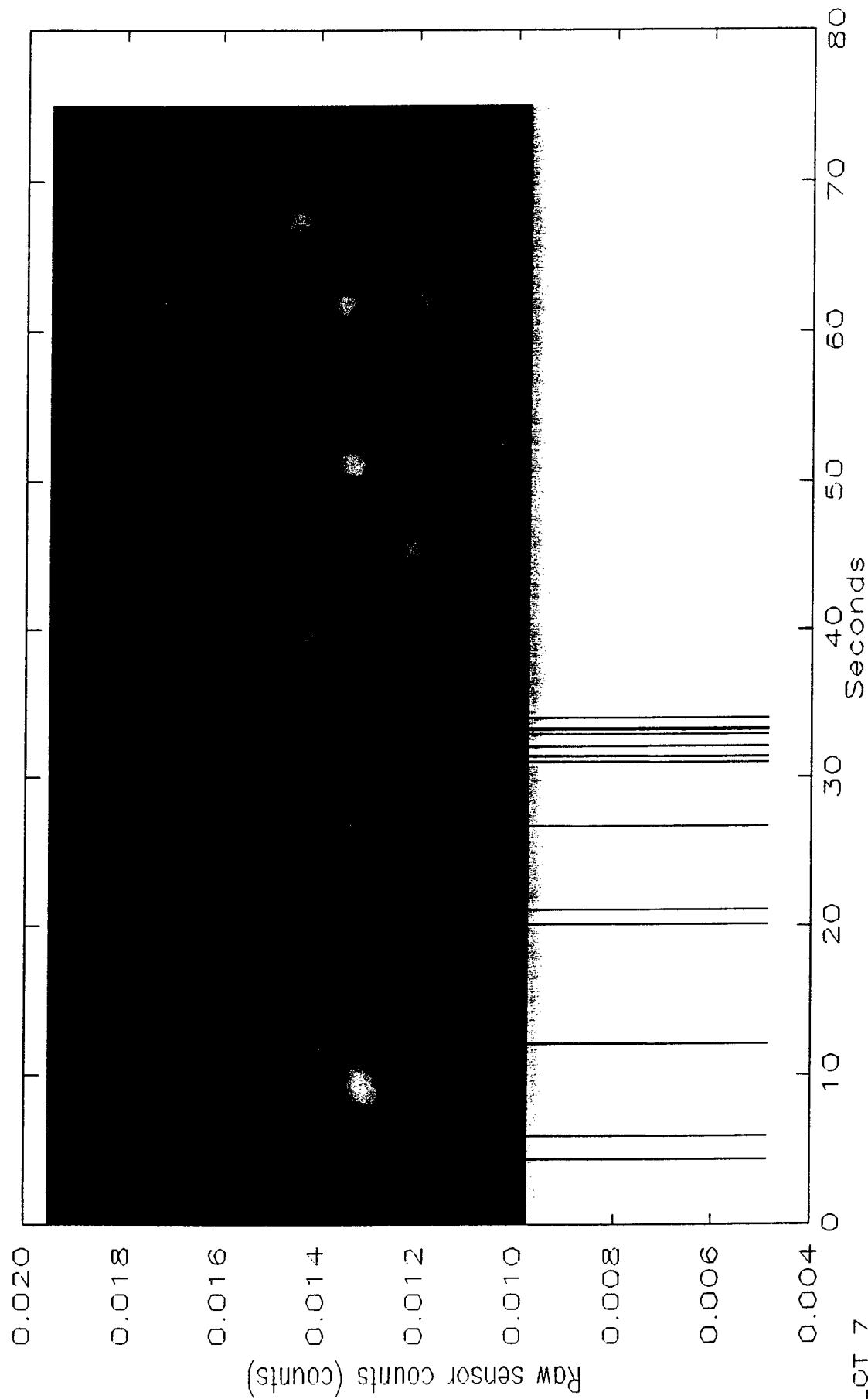
FOR OFFICIAL USE ONLY



FOR OFFICIAL USE ONLY

tfe91287 01 == Signal ID: FSMPOS AZ

91:287:10:17:23.622, NPTS: 75000, Sample Freq: 1000. samps/sec  
Min: 0.4883E-02 Max: 0.1953E-01 Mean: 0.1440E-01 SD: 0.389E-02 RMS: 0.149E-01



PLOT 7

VISAGE V6.14 24-OCT-91

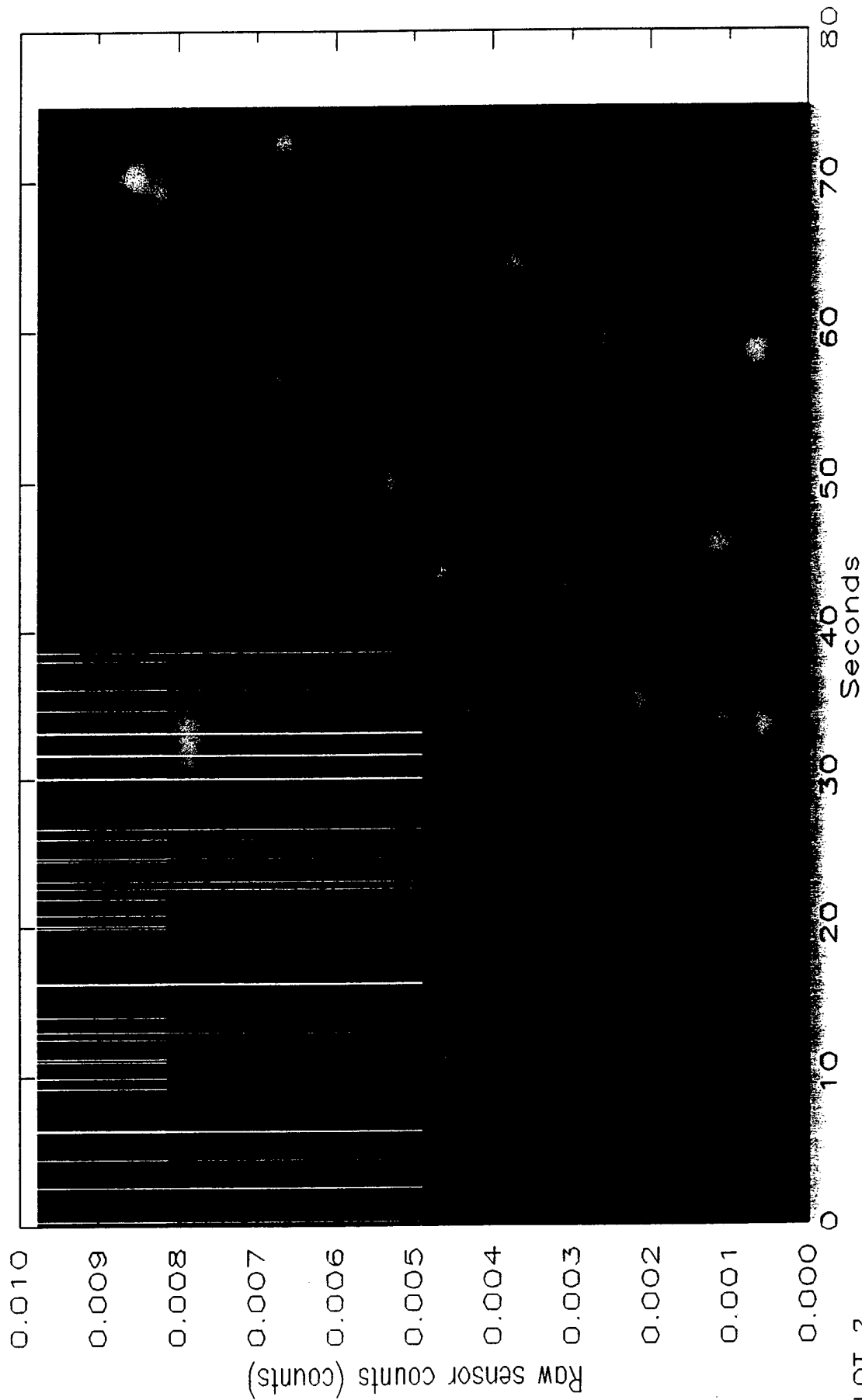
LANG.TFE FSMPOS AZ.PEU;1

FOR OFFICIAL USE ONLY

FOR OFFICIAL USE ONLY

tfe91287 01 == Signal ID: FSMPOSEL

91:287:10:17:23.622. NPTS: 75000, Sample Freq: 1000. samps/sec  
Min: 0.0000E+00 Max: 0.9766E-02 Mean: 0.3468E-02 SD: 0.293E-02 RMS: 0.454E-02



PLOT 2

VISAGE V6.14 24-OCT-91

LANG.TFE FSMPOSEL.PEU;1

FOR OFFICIAL USE ONLY

**APPENDIX B**

**CAMERA CALIBRATION LOGS**

Completed by MIKE D. L. FURZ L.DATE 10/14/91

## TFE CALIBRATION LOG

SYSTEM TFEMAL TEST\_ID TIGRESS INTERVAL 91287-11

Target Object:

STARLIGHT  
SOURCE

OTHER \_\_\_\_\_

Description of Object

#2491

CHARTER RADIMETRIC:08:15:00.00 Z

Purpose of Calibration

RadiometricCamera Information

	<u>Camera</u>	<u>Gain/ND</u>	<u>Spectral Filtering</u>	<u>Tape or Disk #</u>	<u>Start Frame</u>	<u># of Frames</u>
	<input type="checkbox"/> Wide Acquisition					
4	<input checked="" type="checkbox"/> Narrow Acquisition <small>INTENSIFIED</small>	<u>7.8 V</u> <u>16000 <math>\mu</math>sec / <math>\phi</math></u>		<u>12-004A</u>	<u>7870</u> <u>3670</u>	<u>30</u>
1	<input checked="" type="checkbox"/> WFOV	<u>1 / <math>\phi</math></u>	<u>600 -</u> <u>900 nm</u>	<u>8-002A</u>	<u>3670</u> <u>3730</u>	<u>30</u>
2	<input checked="" type="checkbox"/> NFOV	<u>1 / <math>\phi</math></u>	<u>600 -</u> <u>900 nm</u>	<u>8-003A</u>	<u>3730</u> <u>3830</u>	<u>30</u>
3	<input checked="" type="checkbox"/> Intensified (Laser)	<u>47%</u> <u>FULL RANGE / <math>\phi</math></u>	<u>NONE</u>	<u>12-003A</u>	<u>8830</u> <u>7870</u>	<u>30</u>
	<input type="checkbox"/> IR					

PC Data \_\_\_\_\_

Tracker Data: AMT \_\_\_\_\_

DT \_\_\_\_\_

Weather

Temperature

72<sup>0</sup> F

Humidity

90%

Cloud Cover:

HAZY / FOGGY

100% 75% 50% 25%

0%

Results \_\_\_\_\_

Completed by Mike D. LAURA L.DATE 10/14/91

## TFE CALIBRATION LOG

SYSTEM TFEMAL TEST\_ID TIGRESS INTERVAL 91287-12

Target Object:

STARLIGHT  
SOURCE

OTHER \_\_\_\_\_

Description of Object #2491:08:18:00.000 Z

Purpose of Calibration

RADIOMETRICCamera Information

<u>Camera</u>	<u>Gain/ND</u>	<u>Spectral Filtering</u>	<u>Tape or Disk #</u>	<u>Start Frame</u>	<u># of Frames</u>
<input type="checkbox"/> Wide Acquisition					
<input checked="" type="checkbox"/> Narrow Acquisition <small>INTENSIFIED</small>	<u>7.8V</u> <u>16000w/40</u>		<u>12-004A</u>	<u>7900</u>	<u>30</u>
<input checked="" type="checkbox"/> WFOV	<u>1 / 0</u>	<u>600-</u> <u>900nm</u>	<u>8-002A</u>	<u>3700</u>	<u>30</u>
<input checked="" type="checkbox"/> NFOV	<u>1 / 0</u>	<u>600-</u> <u>900nm</u>	<u>8-003A</u>	<u>3760</u>	<u>30</u>
<input checked="" type="checkbox"/> Intensified (Laser)	<u>100%</u>	<u>2nm @</u> <u>530nm</u>	<u>12-003A</u>	<u>8860</u>	<u>30</u>
<input type="checkbox"/> IR					

PC Data \_\_\_\_\_

Tracker Data: AMT \_\_\_\_\_

DT \_\_\_\_\_

WeatherTemperature 72°F Humidity 90%Cloud Cover: HAZY / FOGGY100% 75% 50% 25% 0%

Results \_\_\_\_\_

Completed by MIKE D. LAURA L.DATE 00/14/91**TFE CALIBRATION LOG**SYSTEM TFEMAL TEST\_ID TIGRESS INTERVAL 91287.13

Target Object:

STARLIGHT  
SOURCE

OTHER \_\_\_\_\_

Description of Object #1411  $\theta^1$  TAU  $\theta^2$  TAU  $\Delta \approx 400 \text{ arc sec}$ 008281.00.000 Z

Purpose of Calibration

ANGULAR**Camera Information**

<u>Camera</u>	<u>Gain/ND</u>	<u>Spectral Filtering</u>	<u>Tape or Disk #</u>	<u>Start Frame</u>	<u># of Frames</u>
<input type="checkbox"/> Wide Acquisition					
<input checked="" type="checkbox"/> Narrow Acquisition	<u>7.8 v</u> <u>16000 <math>\mu</math>sec/<math>\phi</math></u>		<u>12-004A</u>	<u>7930</u> <del>3390</del>	<u>30</u>
<input checked="" type="checkbox"/> WFOV	<u>1/<math>\phi</math></u>	<u>600- 900 nm</u>	<u>A-002A</u>	<u>3730</u> <del>3390</del>	<u>30</u>
<input checked="" type="checkbox"/> NFOV	<u>1/<math>\phi</math></u>	<u>600- 900 nm</u>	<u>8-003A</u>	<u>3790</u> <del>3390</del>	<u>30</u>
<input checked="" type="checkbox"/> Intensified (Laser)	<u>100%</u>	<u>2 nm @ 530 nm</u>	<u>12-003A</u>	<u>8890</u> <del>3390</del>	<u>30</u>
<input type="checkbox"/> IR					

PC Data \_\_\_\_\_

Tracker Data: AMT \_\_\_\_\_  
DT \_\_\_\_\_**Weather**Temperature 72°F Humidity 90%Cloud Cover: HAZ / Foggy  
100% 75% 50% 25% (0%)Results only ~~both~~ Intensified Boresight had  
wide enough field of view to see both stars  
of the double.

Completed by Mike D. LAURA LDATE 10/14/91

# TFE CALIBRATION LOG

SYSTEM TFEMAL TEST\_ID TIGRESS INTERVAL 91287-14

Target Object:

STARLIGHT  
SOURCE

OTHER \_\_\_\_\_

Description of Object #2491Purpose of Calibration ANGULAR - TOP RIGHT HAND  
CORNER OF LASER CAMERA

## Camera Information

Camera	Gain/ND	Spectral Filtering	Tape or Disk #	Start Frame	# of Frames
<input type="checkbox"/> Wide Acquisition					
<input checked="" type="checkbox"/> Narrow Acquisition	<u>7.8V</u> <u>16000 wsec/φ</u>		<u>12-004A</u>	<u>7960</u>	<u>30</u>
<input checked="" type="checkbox"/> WFOV	<u>1 / φ</u>	<u>600 -</u> <u>900 nm</u>	<u>8-002A</u>	<u>3760</u>	<u>30</u>
<input checked="" type="checkbox"/> NFOV	<u>1 / φ</u>	<u>600 -</u> <u>900 nm</u>	<u>8-003A</u>	<u>3820</u>	<u>30</u>
<input checked="" type="checkbox"/> Intensified (Laser)	<u>100 %</u>	<u>2nm@</u> <u>530 nm</u>	<u>12-003A</u>	<u>8920</u>	<u>30</u>
<input type="checkbox"/> IR					

PC Data \_\_\_\_\_

Tracker Data: AMT \_\_\_\_\_  
DT \_\_\_\_\_

## Weather

Temperature \_\_\_\_\_ Humidity \_\_\_\_\_

Cloud Cover:

100% 75% 50% 25% 0%

Results \_\_\_\_\_

Completed by \_\_\_\_\_

DATE 10/14/91**TFE CALIBRATION LOG**SYSTEM TFEMAL TEST\_ID TIGRESS INTERVAL 91287-15Target Object: STAR LIGHT SOURCE OTHER \_\_\_\_\_Description of Object # 2491Purpose of Calibration ANGULAR - LEFT HAND SIDE OF  
LASER CAMERA**Camera Information**

<u>Camera</u>	<u>Gain/ND</u>	<u>Spectral Filtering</u>	<u>Tape or Disk #</u>	<u>Start Frame</u>	<u># of Frames</u>
<input type="checkbox"/> Wide Acquisition	_____	_____	_____	_____	_____
<input checked="" type="checkbox"/> Narrow Acquisition	<u>7.84</u> <u>16000µsec / φ</u>	_____	<u>12-004A</u>	<u>887990</u>	<u>30</u>
<input checked="" type="checkbox"/> WFOV	<u>1 / φ</u>	<u>600 - 900 nm</u>	<u>8-002A</u>	<u>3790</u>	<u>30</u>
<input checked="" type="checkbox"/> NFOV	<u>1 / φ</u>	<u>600 - 900 nm</u>	<u>8-003A</u>	<u>3850</u>	<u>30</u>
<input checked="" type="checkbox"/> Intensified (Laser)	<u>100% / φ</u>	<u>2nm @ 530</u>	<u>12-003A</u>	<u>8950</u>	<u>30</u>
<input type="checkbox"/> IR	_____	_____	_____	_____	_____

PC Data \_\_\_\_\_

Tracker Data: AMT \_\_\_\_\_  
DT \_\_\_\_\_**Weather**

Temperature \_\_\_\_\_ Humidity \_\_\_\_\_

Cloud Cover:

100% 75% 50% 25% 0%

Results \_\_\_\_\_



Completed by \_\_\_\_\_

DATE 10/14/91

# TFE CALIBRATION LOG

SYSTEM TFEMAL TEST\_ID TIGRESS INTERVAL 91287-16Target Object: STAR LIGHT SOURCE OTHER \_\_\_\_\_Description of Object #2491Purpose of Calibration ANGULAR - STAR AT BOTTOM  
LEFT HAND CORNER OF LASER CAMERA

## Camera Information

Camera	Gain/ND	Spectral Filtering	Tape or Disk #	Start Frame	# of Frames
<input type="checkbox"/> Wide Acquisition	_____	_____	_____	_____	_____
<input type="checkbox"/> Narrow Acquisition	<u>7.8v</u> <u>16000µsec/φ</u>	_____	<u>12-004A</u>	<u>8020</u>	<u>30</u>
<input type="checkbox"/> WFOV	<u>1/φ</u>	<u>600 - 900 nm</u>	<u>8-002A</u>	<u>3820</u>	<u>30</u>
<input type="checkbox"/> NFOV	<u>1/φ</u>	<u>600 - 900 nm</u>	<u>8-003A</u>	<u>3880</u>	<u>30</u>
<input type="checkbox"/> Intensified (Laser)	<u>100%/φ</u>	<u>2µm @ 530 nm</u>	<u>12-003A</u>	<u>8980</u>	<u>30</u>
<input type="checkbox"/> IR	_____	_____	_____	_____	_____

PC Data \_\_\_\_\_

Tracker Data: AMT \_\_\_\_\_  
DT \_\_\_\_\_Weather HAZY

Temperature \_\_\_\_\_ Humidity \_\_\_\_\_

Cloud Cover:

100% 75% 50% 25% 0%

Results \_\_\_\_\_

Completed by \_\_\_\_\_

DATE 10/14/91**TFE CALIBRATION LOG**SYSTEM TFEMAL TEST\_ID TIGRESS INTERVAL 91287-17

Target Object:

STARLIGHT  
SOURCE

OTHER \_\_\_\_\_

Description of Object

#2491

Purpose of Calibration ANGULAR - STAR AT BOTTOM  
RIGHT HAND CORNER OF LASER CAMERA**Camera Information**

<u>Camera</u>	<u>Gain/ND</u>	<u>Spectral Filtering</u>	<u>Tape or Disk #</u>	<u>Start Frame</u>	<u># of Frames</u>
<input type="checkbox"/> Wide Acquisition	_____	_____	_____	_____	_____
<input checked="" type="checkbox"/> Narrow Acquisition	<u>7.8V</u> <u>16000µsec/φ</u>	_____	<u>12-004A</u>	<u>8050</u>	<u>30</u>
<input checked="" type="checkbox"/> WFOV	<u>1/φ</u>	<u>600 - 900nm</u>	<u>8-002A</u>	<u>3850</u>	<u>30</u>
<input checked="" type="checkbox"/> NFOV	<u>1/φ</u>	<u>600 - 900nm</u>	<u>8-003A</u>	<u>3910</u>	<u>30</u>
<input checked="" type="checkbox"/> Intensified (Laser)	<u>100%/φ</u>	<u>2nm @ 530nm</u>	<u>12-003A</u>	<u>9010</u>	<u>30</u>
<input type="checkbox"/> IR	_____	_____	_____	_____	_____

PC Data \_\_\_\_\_

Tracker Data:

AMT \_\_\_\_\_

DT \_\_\_\_\_

Weather HAZY

Temperature \_\_\_\_\_

Humidity \_\_\_\_\_

Cloud Cover:

100%

75%

50%

25%

0%

Results \_\_\_\_\_

## APPENDIX C

The following is a frame by frame timestamp record of the Laser Camera Video. Other cameras have not yet been processed since the original disks, with the IRIG information, are still at Malabar.

A more concise and compact way of conveying this information is being developed.

Frame	IRIG time
9188	287:10:17:31.493
9189	287:10:17:31.527
9190	287:10:17:31.560
9191	287:10:17:31.593
9192	287:10:17:31.627
9193	287:10:17:31.660
9194	287:10:17:31.694
9195	287:10:17:31.727
9196	287:10:17:31.760
9197	287:10:17:31.794
9198	287:10:17:31.827
9199	287:10:17:31.860
9200	287:10:17:31.894
9201	287:10:17:31.927
9202	287:10:17:31.960
9203	287:10:17:31.994
9204	287:10:17:32.027
9205	287:10:17:32.061
9206	287:10:17:32.094
9207	287:10:17:32.127
9208	287:10:17:32.161
9209	287:10:17:32.194
9210	287:10:17:32.227
9211	287:10:17:32.261
9212	287:10:17:32.294
9213	287:10:17:32.328
9214	287:10:17:32.361
9215	287:10:17:32.394
9216	287:10:17:32.428
9217	287:10:17:32.461
9218	287:10:17:32.494
9219	287:10:17:32.528
9220	287:10:17:32.561
9221	287:10:17:32.594
9222	287:10:17:32.628
9223	287:10:17:32.661
9224	287:10:17:32.695
9225	287:10:17:32.728
9226	287:10:17:32.761
9227	287:10:17:32.795
9228	287:10:17:32.828
9229	287:10:17:32.861
9230	287:10:17:32.895
9231	287:10:17:32.928
9232	287:10:17:32.961
9233	287:10:17:32.995
9234	287:10:17:33.028
9235	287:10:17:33.062
9236	287:10:17:33.095
9237	287:10:17:33.128
9238	287:10:17:33.162
9239	287:10:17:33.195
9240	287:10:17:33.228
9241	287:10:17:33.262
9242	287:10:17:33.295
9243	287:10:17:33.328
9244	287:10:17:33.362
9245	287:10:17:33.395
9246	287:10:17:33.429
9247	287:10:17:33.462
9248	287:10:17:33.495
9249	287:10:17:33.529
9250	287:10:17:33.562
9251	287:10:17:33.595

LASER CAMERA

ORIGINAL 12" DISK

DATA RESIDES ON FRAMES 9040 - 11289

START → 9040 : 287:10:17:26:560

9252	287:10:17:33.629
9253	287:10:17:33.662
9254	287:10:17:33.696
9255	287:10:17:33.729
9256	287:10:17:33.762
9257	287:10:17:33.796
9258	287:10:17:33.829
9259	287:10:17:33.862
9260	287:10:17:33.896
9261	287:10:17:33.929
9262	287:10:17:33.962
9263	287:10:17:33.996
9264	287:10:17:34.029
9265	287:10:17:34.063
9266	287:10:17:34.096
9267	287:10:17:34.129
9268	287:10:17:34.163
9269	287:10:17:34.196
9270	287:10:17:34.229
9271	287:10:17:34.263
9272	287:10:17:34.296
9273	287:10:17:34.330
9274	287:10:17:34.363
9275	287:10:17:34.396
9276	287:10:17:34.430
9277	287:10:17:34.463
9278	287:10:17:34.496
9279	287:10:17:34.530
9280	287:10:17:34.563
9281	287:10:17:34.596
9282	287:10:17:34.630
9283	287:10:17:34.663
9284	287:10:17:34.697
9285	287:10:17:34.730
9286	287:10:17:34.763
9287	287:10:17:34.797
9288	287:10:17:34.830
9289	287:10:17:34.863
9290	287:10:17:34.897
9291	287:10:17:34.930
9292	287:10:17:34.963
9293	287:10:17:34.997
9294	287:10:17:35.030
9295	287:10:17:35.064
9296	287:10:17:35.097
9297	287:10:17:35.130
9298	287:10:17:35.164
9299	287:10:17:35.197
9300	287:10:17:35.230
9301	287:10:17:35.264
9302	287:10:17:35.297
9303	287:10:17:35.331
9304	287:10:17:35.364
9305	287:10:17:35.397
9306	287:10:17:35.431
9307	287:10:17:35.464
9308	287:10:17:35.497
9309	287:10:17:35.531
9310	287:10:17:35.564
9311	287:10:17:35.597
9312	287:10:17:35.631
9313	287:10:17:35.664
9314	287:10:17:35.698
9315	287:10:17:35.731
9316	287:10:17:35.764
9317	287:10:17:35.798

9318	287:10:17:35.831
9319	287:10:17:35.864
9320	287:10:17:35.898
9321	287:10:17:35.931
9322	287:10:17:35.964
9323	287:10:17:35.998
9324	287:10:17:36.031
9325	287:10:17:36.065
9326	287:10:17:36.098
9327	287:10:17:36.131
9328	287:10:17:36.165
9329	287:10:17:36.198
9330	287:10:17:36.231
9331	287:10:17:36.265
9332	287:10:17:36.298
9333	287:10:17:36.332
9334	287:10:17:36.365
9335	287:10:17:36.398
9336	287:10:17:36.432
9337	287:10:17:36.465
9338	287:10:17:36.498
9339	287:10:17:36.532
9340	287:10:17:36.565
9341	287:10:17:36.598
9342	287:10:17:36.632
9343	287:10:17:36.665
9344	287:10:17:36.699
9345	287:10:17:36.732
9346	287:10:17:36.765
9347	287:10:17:36.799
9348	287:10:17:36.832
9349	287:10:17:36.865
9350	287:10:17:36.899
9351	287:10:17:36.932
9352	287:10:17:36.965
9353	287:10:17:36.999
9354	287:10:17:37.032
9355	287:10:17:37.066
9356	287:10:17:37.099
9357	287:10:17:37.132
9358	287:10:17:37.166
9359	287:10:17:37.199
9360	287:10:17:37.232
9361	287:10:17:37.266
9362	287:10:17:37.299
9363	287:10:17:37.332
9364	287:10:17:37.366
9365	287:10:17:37.399
9366	287:10:17:37.433
9367	287:10:17:37.466
9368	287:10:17:37.499
9369	287:10:17:37.533
9370	287:10:17:37.566
9371	287:10:17:37.599
9372	287:10:17:37.633
9373	287:10:17:37.666
9374	287:10:17:37.700
9375	287:10:17:37.733
9376	287:10:17:37.766
9377	287:10:17:37.800
9378	287:10:17:37.833
9379	287:10:17:37.866
9380	287:10:17:37.900
9381	287:10:17:37.933
9382	287:10:17:37.966
9383	287:10:17:38.000

9384 287:10:17:38.033  
9385 287:10:17:38.067  
9386 287:10:17:38.100  
9387 287:10:17:38.133  
9388 287:10:17:38.167  
9389 287:10:17:38.200  
9390 287:10:17:38.233  
9391 287:10:17:38.267  
9392 287:10:17:38.300  
9393 287:10:17:38.333  
9394 287:10:17:38.367  
9395 287:10:17:38.400  
9396 287:10:17:38.434  
9397 287:10:17:38.467  
9398 287:10:17:38.500  
9399 287:10:17:38.534  
9400 287:10:17:38.567  
9401 287:10:17:38.600  
9402 287:10:17:38.634  
9403 287:10:17:38.667  
9404 287:10:17:38.701  
9405 287:10:17:38.734  
9406 287:10:17:38.767  
9407 287:10:17:38.801  
9408 287:10:17:38.834  
9409 287:10:17:38.867  
9410 287:10:17:38.901  
9411 287:10:17:38.934  
9412 287:10:17:38.967  
9413 287:10:17:39.001  
9414 287:10:17:39.034  
9415 287:10:17:39.068  
9416 287:10:17:39.101  
9417 287:10:17:39.134  
9418 287:10:17:39.168  
9419 287:10:17:39.201  
9420 287:10:17:39.234  
9421 287:10:17:39.268  
9422 287:10:17:39.301  
9423 287:10:17:39.334  
9424 287:10:17:39.368  
9425 287:10:17:39.401  
9426 287:10:17:39.435  
9427 287:10:17:39.468  
9428 287:10:17:39.501  
9429 287:10:17:39.535  
9430 287:10:17:39.568  
9431 287:10:17:39.601  
9432 287:10:17:39.635  
9433 287:10:17:39.668  
9434 287:10:17:39.702  
9435 287:10:17:39.735  
9436 287:10:17:39.768  
9437 287:10:17:39.802  
9438 287:10:17:39.835  
9439 287:10:17:39.868  
9440 287:10:17:39.902  
9441 287:10:17:39.935  
9442 287:10:17:39.968  
9443 287:10:17:40.002  
9444 287:10:17:40.035  
9445 287:10:17:40.069  
9446 287:10:17:40.102  
9447 287:10:17:40.135  
9448 287:10:17:40.169  
9449 287:10:17:40.202



9450 287:10:17:40.235  
9451 287:10:17:40.269  
9452 287:10:17:40.302  
9453 287:10:17:40.335  
9454 287:10:17:40.369  
9455 287:10:17:40.402  
9456 287:10:17:40.436  
9457 287:10:17:40.469  
9458 287:10:17:40.502  
9459 287:10:17:40.536  
9460 287:10:17:40.569  
9461 287:10:17:40.602  
9462 287:10:17:40.636  
9463 287:10:17:40.669  
9464 287:10:17:40.703  
9465 287:10:17:40.736  
9466 287:10:17:40.769  
9467 287:10:17:40.803  
9468 287:10:17:40.836  
9469 287:10:17:40.869  
9470 287:10:17:40.903  
9471 287:10:17:40.936  
9472 287:10:17:40.969  
9473 287:10:17:41.003  
9474 287:10:17:41.036  
9475 287:10:17:41.070  
9476 287:10:17:41.103  
9477 287:10:17:41.136  
9478 287:10:17:41.170  
9479 287:10:17:41.203  
9480 287:10:17:41.236  
9481 287:10:17:41.270  
9482 287:10:17:41.303  
9483 287:10:17:41.336  
9484 287:10:17:41.370  
9485 287:10:17:41.403  
9486 287:10:17:41.437  
9487 287:10:17:41.470  
9488 287:10:17:41.503  
9489 287:10:17:41.537  
9490 287:10:17:41.570  
9491 287:10:17:41.603  
9492 287:10:17:41.637  
9493 287:10:17:41.670  
9494 287:10:17:41.704  
9495 287:10:17:41.737  
9496 287:10:17:41.770  
9497 287:10:17:41.804  
9498 287:10:17:41.837  
9499 287:10:17:41.870  
9500 287:10:17:41.904  
9501 287:10:17:41.937  
9502 287:10:17:41.970  
9503 287:10:17:42.004  
9504 287:10:17:42.037  
9505 287:10:17:42.071  
9506 287:10:17:42.104  
9507 287:10:17:42.137  
9508 287:10:17:42.171  
9509 287:10:17:42.204  
9510 287:10:17:42.237  
9511 287:10:17:42.271  
9512 287:10:17:42.304  
9513 287:10:17:42.337  
9514 287:10:17:42.371  
9515 287:10:17:42.404

9516 287:10:17:42.438  
9517 287:10:17:42.471  
9518 287:10:17:42.504  
9519 287:10:17:42.538  
9520 287:10:17:42.571  
9521 287:10:17:42.604  
9522 287:10:17:42.638  
9523 287:10:17:42.671  
9524 287:10:17:42.705  
9525 287:10:17:42.738  
9526 287:10:17:42.771  
9527 287:10:17:42.805  
9528 287:10:17:42.838  
9529 287:10:17:42.871  
9530 287:10:17:42.905  
9531 287:10:17:42.938  
9532 287:10:17:42.971  
9533 287:10:17:43.005  
9534 287:10:17:43.038  
9535 287:10:17:43.072  
9536 287:10:17:43.105  
9537 287:10:17:43.138  
9538 287:10:17:43.172  
9539 287:10:17:43.205  
9540 287:10:17:43.238  
9541 287:10:17:43.272  
9542 287:10:17:43.305  
9543 287:10:17:43.338  
9544 287:10:17:43.372  
9545 287:10:17:43.405  
9546 287:10:17:43.439  
9547 287:10:17:43.472  
9548 287:10:17:43.505  
9549 287:10:17:43.539  
9550 287:10:17:43.572  
9551 287:10:17:43.605  
9552 287:10:17:43.639  
9553 287:10:17:43.672  
9554 287:10:17:43.706  
9555 287:10:17:43.739  
9556 287:10:17:43.772  
9557 287:10:17:43.806  
9558 287:10:17:43.839  
9559 287:10:17:43.872  
9560 287:10:17:43.906  
9561 287:10:17:43.939  
9562 287:10:17:43.972  
9563 287:10:17:44.006  
9564 287:10:17:44.039  
9565 287:10:17:44.073  
9566 287:10:17:44.106  
9567 287:10:17:44.139  
9568 287:10:17:44.173  
9569 287:10:17:44.206  
9570 287:10:17:44.239  
9571 287:10:17:44.273  
9572 287:10:17:44.306  
9573 287:10:17:44.339  
9574 287:10:17:44.373  
9575 287:10:17:44.406  
9576 287:10:17:44.440  
9577 287:10:17:44.473  
9578 287:10:17:44.506  
9579 287:10:17:44.540  
9580 287:10:17:44.573  
9581 287:10:17:44.606

9582	287:10:17:44.640
9583	287:10:17:44.673
9584	287:10:17:44.706
9585	287:10:17:44.740
9586	287:10:17:44.773
9587	287:10:17:44.807
9588	287:10:17:44.840
9589	287:10:17:44.873
9590	287:10:17:44.907
9591	287:10:17:44.940
9592	287:10:17:44.973
9593	287:10:17:45.007
9594	287:10:17:45.040
9595	287:10:17:45.074
9596	287:10:17:45.107
9597	287:10:17:45.140
9598	287:10:17:45.174
9599	287:10:17:45.207
9600	287:10:17:45.240
9601	287:10:17:45.274
9602	287:10:17:45.307
9603	287:10:17:45.340
9604	287:10:17:45.374
9605	287:10:17:45.407
9606	287:10:17:45.441
9607	287:10:17:45.474
9608	287:10:17:45.507
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10766	287:10:18:24.213
10767	287:10:18:24.246
10768	287:10:18:24.279
10769	287:10:18:24.313

10770	287:10:18:24.346
10771	287:10:18:24.379
10772	287:10:18:24.413
10773	287:10:18:24.446
10774	287:10:18:24.480
10775	287:10:18:24.513
10776	287:10:18:24.546
10777	287:10:18:24.580
10778	287:10:18:24.613
10779	287:10:18:24.646
10780	287:10:18:24.680
10781	287:10:18:24.713
10782	287:10:18:24.746
10783	287:10:18:24.780
10784	287:10:18:24.813
10785	287:10:18:24.847
10786	287:10:18:24.880
10787	287:10:18:24.913
10788	287:10:18:24.947
10789	287:10:18:24.980
10790	287:10:18:25.013
10791	287:10:18:25.047
10792	287:10:18:25.080
10793	287:10:18:25.113
10794	287:10:18:25.147
10795	287:10:18:25.180
10796	287:10:18:25.214
10797	287:10:18:25.247
10798	287:10:18:25.280
10799	287:10:18:25.314
10800	287:10:18:25.347
10801	287:10:18:25.380
10802	287:10:18:25.414
10803	287:10:18:25.447
10804	287:10:18:25.481
10805	287:10:18:25.514
10806	287:10:18:25.547
10807	287:10:18:25.581
10808	287:10:18:25.614
10809	287:10:18:25.647
10810	287:10:18:25.681
10811	287:10:18:25.714
10812	287:10:18:25.747
10813	287:10:18:25.781
10814	287:10:18:25.814
10815	287:10:18:25.848
10816	287:10:18:25.881
10817	287:10:18:25.914
10818	287:10:18:25.948
10819	287:10:18:25.981
10820	287:10:18:26.014
10821	287:10:18:26.048
10822	287:10:18:26.081
10823	287:10:18:26.114
10824	287:10:18:26.148
10825	287:10:18:26.181
10826	287:10:18:26.215
10827	287:10:18:26.248
10828	287:10:18:26.281
10829	287:10:18:26.315
10830	287:10:18:26.348
10831	287:10:18:26.381
10832	287:10:18:26.415
10833	287:10:18:26.448
10834	287:10:18:26.482
10835	287:10:18:26.515

10836	287:10:18:26.548
10837	287:10:18:26.582
10838	287:10:18:26.615
10839	287:10:18:26.648
10840	287:10:18:26.682
10841	287:10:18:26.715
10842	287:10:18:26.748
10843	287:10:18:26.782
10844	287:10:18:26.815
10845	287:10:18:26.849
10846	287:10:18:26.882
10847	287:10:18:26.915
10848	287:10:18:26.949
10849	287:10:18:26.982
10850	287:10:18:27.015
10851	287:10:18:27.049
10852	287:10:18:27.082
10853	287:10:18:27.115
10854	287:10:18:27.149
10855	287:10:18:27.182
10856	287:10:18:27.216
10857	287:10:18:27.249
10858	287:10:18:27.282
10859	287:10:18:27.316
10860	287:10:18:27.349
10861	287:10:18:27.382
10862	287:10:18:27.416
10863	287:10:18:27.449
10864	287:10:18:27.482
10865	287:10:18:27.516
10866	287:10:18:27.549
10867	287:10:18:27.583
10868	287:10:18:27.616
10869	287:10:18:27.649
10870	287:10:18:27.683
10871	287:10:18:27.716
10872	287:10:18:27.749
10873	287:10:18:27.783
10874	287:10:18:27.816
10875	287:10:18:27.850
10876	287:10:18:27.883
10877	287:10:18:27.916
10878	287:10:18:27.950
10879	287:10:18:27.983
10880	287:10:18:28.016
10881	287:10:18:28.050
10882	287:10:18:28.083
10883	287:10:18:28.116
10884	287:10:18:28.150
10885	287:10:18:28.183
10886	287:10:18:28.217
10887	287:10:18:28.250
10888	287:10:18:28.283
10889	287:10:18:28.317
10890	287:10:18:28.350
10891	287:10:18:28.383
10892	287:10:18:28.417
10893	287:10:18:28.450
10894	287:10:18:28.483
10895	287:10:18:28.517
10896	287:10:18:28.550
10897	287:10:18:28.584
10898	287:10:18:28.617
10899	287:10:18:28.650
10900	287:10:18:28.684
10901	287:10:18:28.717

10902	287:10:18:28.750
10903	287:10:18:28.784
10904	287:10:18:28.817
10905	287:10:18:28.851
10906	287:10:18:28.884
10907	287:10:18:28.917
10908	287:10:18:28.951
10909	287:10:18:28.984
10910	287:10:18:29.017
10911	287:10:18:29.051
10912	287:10:18:29.084
10913	287:10:18:29.117
10914	287:10:18:29.151
10915	287:10:18:29.184
10916	287:10:18:29.218
10917	287:10:18:29.251
10918	287:10:18:29.284
10919	287:10:18:29.318
10920	287:10:18:29.351
10921	287:10:18:29.384
10922	287:10:18:29.418
10923	287:10:18:29.451
10924	287:10:18:29.484
10925	287:10:18:29.518
10926	287:10:18:29.551
10927	287:10:18:29.585
10928	287:10:18:29.618
10929	287:10:18:29.651
10930	287:10:18:29.685
10931	287:10:18:29.718
10932	287:10:18:29.751
10933	287:10:18:29.785
10934	287:10:18:29.818
10935	287:10:18:29.852
10936	287:10:18:29.885
10937	287:10:18:29.918
10938	287:10:18:29.952
10939	287:10:18:29.985
10940	287:10:18:30.018
10941	287:10:18:30.052
10942	287:10:18:30.085
10943	287:10:18:30.118
10944	287:10:18:30.152
10945	287:10:18:30.185
10946	287:10:18:30.219
10947	287:10:18:30.252
10948	287:10:18:30.285
10949	287:10:18:30.319
10950	287:10:18:30.352
10951	287:10:18:30.385
10952	287:10:18:30.419
10953	287:10:18:30.452
10954	287:10:18:30.485
10955	287:10:18:30.519
10956	287:10:18:30.552
10957	287:10:18:30.586
10958	287:10:18:30.619
10959	287:10:18:30.652
10960	287:10:18:30.686
10961	287:10:18:30.719
10962	287:10:18:30.752
10963	287:10:18:30.786
10964	287:10:18:30.819
10965	287:10:18:30.853
10966	287:10:18:30.886
10967	287:10:18:30.919

10968	287:10:18:30.953
10969	287:10:18:30.986
10970	287:10:18:31.019
10971	287:10:18:31.053
10972	287:10:18:31.086
10973	287:10:18:31.119
10974	287:10:18:31.153
10975	287:10:18:31.186
10976	287:10:18:31.220
10977	287:10:18:31.253
10978	287:10:18:31.286
10979	287:10:18:31.320
10980	287:10:18:31.353
10981	287:10:18:31.386
10982	287:10:18:31.420
10983	287:10:18:31.453
10984	287:10:18:31.486
10985	287:10:18:31.520
10986	287:10:18:31.553
10987	287:10:18:31.587
10988	287:10:18:31.620
10989	287:10:18:31.653
10990	287:10:18:31.687
10991	287:10:18:31.720
10992	287:10:18:31.753
10993	287:10:18:31.787
10994	287:10:18:31.820
10995	287:10:18:31.854
10996	287:10:18:31.887
10997	287:10:18:31.920
10998	287:10:18:31.954
10999	287:10:18:31.987
11000	287:10:18:32.020
11001	287:10:18:32.054
11002	287:10:18:32.087
11003	287:10:18:32.120
11004	287:10:18:32.154
11005	287:10:18:32.187
11006	287:10:18:32.221
11007	287:10:18:32.254
11008	287:10:18:32.287
11009	287:10:18:32.321
11010	287:10:18:32.354
11011	287:10:18:32.387
11012	287:10:18:32.421
11013	287:10:18:32.454
11014	287:10:18:32.487
11015	287:10:18:32.521
11016	287:10:18:32.554
11017	287:10:18:32.588
11018	287:10:18:32.621
11019	287:10:18:32.654
11020	287:10:18:32.688
11021	287:10:18:32.721
11022	287:10:18:32.754
11023	287:10:18:32.788
11024	287:10:18:32.821
11025	287:10:18:32.855
11026	287:10:18:32.888
11027	287:10:18:32.921
11028	287:10:18:32.955
11029	287:10:18:32.988
11030	287:10:18:33.021
11031	287:10:18:33.055
11032	287:10:18:33.088
11033	287:10:18:33.121



**APPENDIX D**

The following is a list of TFE signal names and their meanings. Signal name definitions are provided for all of the plots in Appendix A. Prior to each group of signals is a brief description of the source of those signals.

1. DIGITAL TRACKER DATA--Transferred postmission from DT silicon graphics.

MNTT1ENCAZ	---	T1 GIMBAL AZIMUTH POSITION
MNTT1ENCEL	---	T1 GIMBAL ELEVATION POSITION
MNTT1CTRL	---	TFE ENABLE FLAG 4 = VAX, 5 = DT
MNTONTRK	---	DT ON TRACK 0 = NO TRACK, 1 = ON TRACK
MNTT1CMDAZ	---	DT AZIMUTH COMMAND TO T1
MNTT1CMDEL	---	DT ELEVATION COMMAND TO T1
MNTRDRENB	---	RADAR STATUS 0 = OFF, 1 = AVAILABLE, 5 = ENABLED
MNTRADAZ	---	RADAR AZIMUTH
MNTRADEL	---	RADAR ELEVATION
MNTRDASDAZ	---	VAX AZIMUTH COMMANDS TO T1 RDAS
NMTRDASDEL	---	VAX ELEVATION COMMANDS TO T1 RDAS
MNTLOSERRX	---	DT X-AXIS LINE OF SIGHT ERROR
MNTLOSERRY	---	DT Y-AXIS LINE OF SIGHT ERROR

2. ADVANCED MODULAR TRACKER DATA--Transferred postmission from AMT SUN.

AMTSENSOR1	---	CAMERA BEING TRACKED 1 = WFOV, 5 = 500mm BS
AMTONTRACK	---	AMT TRACKING STATUS 0 = NO TRACK, 1 = ON TRACK
AMTTRKTYPE	---	AMT TRACK ALGORITHM 0 = CENTROID, 1 = EDGE
AMTTHRESH	---	AMT TRACK THRESHOLD
AMTCOUNT	---	NUMBER OF PIXELS ABOVE THRESHOLD
AMTSCRERRX	---	AMT X-AXIS TRACK ERROR
AMTSCRERRY	---	AMT Y-AXIS TRACK ERROR
AMTOFFSETX	---	X-AXIS TRACK POINT OFFSET FROM CENTER OF SCREEN
AMTOFFSETY	---	Y-AXIS TRACK POINT OFFSET FROM CENTER OF SCREEN
AMTOFFERRX	---	X-AXIS ERROR FROM OFFSET POINT

AMTOFFERRY	---	Y-AXIS ERROR FROM OFFSET POINT
AMTGTCEK	---	G TRACK GATE X POSITION
AMTGTCEY	---	G TRACK GATE Y POSITION
AMTGTSIZX	---	TRACK GATE X SIZE
AMTGTSIZY	---	TRACK GATE Y SIZE

3. ANALOG DATA --- Acquired realtime to PC using a 12 bit A/D board.

T1POSAZ	---	T1 GIMBAL AZIMUTH POSITION
T1POSEL	---	T1 GIMBAL ELEVATION POSITION
AMTERRAZ	---	AMT AZIMUTH COMMANDS TO FSM
AMTERREL	---	AMT ELEVATION COMMANDS TO FSM
FSMPOSAZ	---	FSM AZIMUTH POSITION
FSMPOSEL	---	FSM ELEVATION POSITION

**APPENDIX E**

Several days prior to Red Tigress II, TFE tracked 2 satellites. The first satellite was successfully illuminated while the second was not. These tracks were done as a part of a TFE system checkout. The SAT TRACK logs follow.

Note that no PC data was taken during these two tracks of any value. Data was transferred from the DT but not processed.

Completed by: MIKE DILLONDATE 10/11/91

## TFE SAT TRACK LOG

SYSTEM TFEMAL TEST\_ID SATRCK INTERVAL 91284-01

Satellite #	<u>1328 BEALON-C</u>	Rise Time	<u>00:27:41 Z</u>
	<u>Azimuth</u>	<u>Elevation</u>	<u>Range</u>
Acquired at:	<u>250°</u>	<u>50°</u>	
Culmination:	<u>210°</u>	<u>53°</u>	<u>1490 (PLA)</u>
Lost at:	<u>175°</u>	<u>28°</u>	

☒ Active Illumination

Laser Power \_\_\_\_\_ Watts

Divergence 45  $\mu$ radRange Gating: FIXEDVARIABLE / MANUALCamera Information

<u>Camera</u>	<u>Gain/ND</u>	<u>Spectral Filtering</u>	<u>Tape or Disk #</u>	<u>Start Frame</u>	<u># of Frames</u>
<input type="checkbox"/> Wide Acquisition	_____	_____	_____	_____	_____
<input checked="" type="checkbox"/> Narrow Acquisition (IR)	<u>VARIABLE</u>	_____	<u>12-004A</u>	<u>3670</u>	<u>3600</u>
<input type="checkbox"/> WFOV	_____	_____	_____	_____	_____
<input type="checkbox"/> NFOV	_____	_____	_____	_____	_____
<input checked="" type="checkbox"/> Intensified (Laser)	_____	<u>2nm @ 530nm</u>	<u>12-003A</u>	<u>3730</u>	<u>4500</u>
<input type="checkbox"/> IR	_____	_____	_____	_____	_____

PC Data NO GOODTracker Data: AMTDT ☒Weather

Temperature \_\_\_\_\_ Humidity \_\_\_\_\_

Cloud Cover:

100% 75% 50% (25%) 0%

Results Successful track. Occasional illumination  
Weak fiber optic power from DT to RDAS  
caused momentary breaks of track, allowing  
the VAX to briefly take over. This caused  
the mount to jitter, pulling the beam on and  
off of the satellite. SAT equipped w/  
retroreflector.

Completed by: MIKE DIMOWDATE 10/11/91

## TFE SAT TRACK LOG

SYSTEM TFEMAL TEST\_ID SATRCK INTERVAL 91284.02Satellite # 3093 GEOS-2Rise Time 00:34:25Acquired at: 180°AzimuthElevationRange

Culmination:

240°53°1715 km (PCA)

Lost at:

320°28°☒ Active Illumination

Laser Power \_\_\_\_\_ Watts

Divergence 45  $\mu$ radRange Gating: FIXEDVARIABLE / MANUALCamera Information

<u>Camera</u>	<u>Gain/ND</u>	<u>Spectral Filtering</u>	<u>Tape or Disk #</u>	<u>Start Frame</u>	<u># of Frames</u>
<input type="checkbox"/> Wide Acquisition	_____	_____	_____	_____	_____
<input checked="" type="checkbox"/> Narrow Acquisition (IB)	<u>VARIABLE</u>	_____	<u>12-004A</u>	<u>7270</u>	<u>600</u>
<input type="checkbox"/> WFOV	_____	_____	_____	_____	_____
<input type="checkbox"/> NFOV	_____	_____	_____	_____	_____
<input checked="" type="checkbox"/> Intensified (Laser)	_____	<u>2nm @ 530 nm</u>	<u>12-003A</u>	<u>8230</u>	<u>600</u>
<input type="checkbox"/> IR	_____	_____	_____	_____	_____

PC Data NOTracker Data: AMT \_\_\_\_\_  
DT ✓Weather

Temperature \_\_\_\_\_ Humidity \_\_\_\_\_

Cloud Cover:

100% 75% 50% 25% 0%

Results Satellite was equipped w/ a retroreflector  
Good track but did not illuminate.  
Video shows neat effect of an  
unsynchronized IB camera.